# Voices from a Fractured Landscape: Fracking, Senses of Place, and Risks in Taranaki, Aotearoa New Zealand

by

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# ABSTRACT

Based in the rural region of Taranaki, Aotearoa New Zealand, this ethnographic study documents the senses of place and risks as variously experienced by members of the communities where hydraulic fracturing occurs. In New Zealand, hydraulic fracturing, or fracking, began in 1989, and approximately 100 operations have been undertaken in 39 wells in the Taranaki region alone. Taranaki is considered the center of oil and gas in the country and is simultaneously a region deeply pervaded by Māori history and values. Companies have established their presence through the years with well sites and production stations around residential areas and schools, and by often sharing land with dairy farms. When I arrived in the region in 2017, little to no ethnographic research had been conducted to understand the risks associated with the practice and the impacts involved with fracking in this area. Between 2017 and 2019, field visits were conducted, and data were collected using semi-structured and unstructured interviews and participant observation to record and understand the stories and voices of community members, farmers, engineers and workers in the oil and gas sector, Māori iwi and hapū members, environmental activists, and resource management and conservation experts. This dissertation presents their perspectives and the experiences around fracking, through a phenomenological lens, to investigate the changes in people's senses of place and belonging.

This dissertation contributes to ethnographic studies focused on unveiling the risks and living conditions experienced by those living in fossil fuel-dependent regions, where new or unconventional extractive techniques occur. This analysis highlights social friction among members of the local community, families, and friends, impacts to sense of place, and the sense of anguish and disempowerment many feel when witnessing the changes in the surrounding environment.

# PREFACE

This thesis is an original work by Anna Bettini. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name "Exploring the socio-cultural and environmental impacts of hydraulic fracturing within the communities of Taranaki region, Aotearoa New Zealand," Study ID: Pro00074854, approved on November 6th, 2017. No part of this dissertation has been previously published.

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# DEDICATION

*To my mother, your curiosity and passion for books has always been an inspiration to me.*
*Thank you for teaching me that knowledge is a powerful tool,*
*and that a book can make a difference in one's life.*

A *mia mamma, la tua curiosità e passione per i libri è sempre stata d'ispirazione per me.*
*Grazie per avermi insegnato che il sapere e la conoscenza sono strumenti potenti,*
*e che un libro è in grado di cambiare la vita ad una persona.*

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**Ehara taku toa, he takitahi, he toa takitini**
*My success should not be bestowed onto me alone, as it was not individual success but success of a collective*
[Māori proverb]

I would like to dedicate a few lines to all those who have been close to me in this path of personal and professional growth.

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# GLOSSARY OF MĀORI WORDS AND TERMS[1]

**Aotearoa**: Māori name for New Zealand

**aroha**: love, respect, compassion

**hapū**: sub-tribe

**hikoi:** march/protest

**iwi**: tribe

**kaitiakitanga**: the ethos of sustainable resource management, guardianship

**kaupapa:** topic, policy, matter for discussion, plan, purpose, scheme, proposal, agenda, subject, programme, theme, issue, initiative.

**kōrero:** a conversation, discussion, or meeting.

**mana:** prestige

**manaakitanga**: reciprocal and unqualified acts of giving, caring, and hospitality

**marae:** tribal meeting grounds; village common

**mauri**: life force

**matauranga Māori**: Māori knowledge and philosophy

**pākeha**: a person of predominantly European descendent

**Papatuānuku**: Earth Mother

**rangatira**: chief

**rangatiratanga**: self-determination, independence or inter-dependence

**Ranginui**: Sky Father

**tangata whenua**: Māori from a particular place or region

**taonga:** treasured object, applied to anything considered to be of value including socially or culturally valuable objects, resources, phenomenon, ideas and techniques.

**Taranaki Mounga/Maunga**: Mount Taranaki

**Te reo**: Māori language, voice

**tikanga**: customary practice, values, protocol

**tupuna**: ancestors, grandparents

**tūrangawaewae:** a place for the feet to stand, where a person feels strong and at home.

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[1] Translations taken from: Mead, Hirini Moko. 2003. *Tikanga Māori: Living by Māori Values.* Huia Publishers: Auckland.; Harmsworth, Garth, Shaun Awatere, and Mahuru Robb. 2013. "Indigenous Māori values and perspectives to inform freshwater management in Aotearoa-New Zealand." *Ecology and Society* 21(4):1-15.

**wai**: water

**wairua:** soul, spirit

**wāhi tapu**: a place sacred to Māori in the traditional, spiritual, religious, ritual, or mythological sense

**whakapapa:** ancestral lineage, ancestral connections, genealogical relationships

**whakatauki**: Māori proverb

**whānau**: family

**whenua**: placenta, land, connection to land and water, the umbilical cord connecting people to place

# CHAPTER ONE: INTRODUCTION

## Why New Zealand and Why Fracking?

There are places in which one is born but never feels at home, and there are places one finds later in life which leave a mark on them. The origin of this journey starts more than a decade ago, when due of a series of serendipitous events, I found myself in a place that shaped my life and the person I am. At the age of sixteen, I left my small town in northern Italy near the metropolis of Milan, where on a rare cloudless day one could see the Lombardian Alps and Prealps standing tall in the sky, for a landscape unfamiliar to me. The first time I landed in Aotearoa New Zealand, I was not conscious of how the following seven months would bring me to revisit the place over and over. At sixteen, I did not know much about "the land of the long white cloud" and information on it was reduced to a few popular objects and pictures. Those months passed by rather slowly, and I struggled being away from those I loved for the first time, regretting the decision to explore a land so distant, and fighting with learning a new language. I returned to Italy thinking that it had been a chapter of my growth and an experience to share with others. However, while the memories of most of the people I encountered faded, the landscape became a constant and recurring image in my mind. To return to that land I embraced almost a nomadic lifestyle, moving away from Italy for my higher education to new countries and places.

A few years later, the unpredictability of life—in spite of this being such a cliché—brought me to rediscover the connection I had with New Zealand. In 2014, while working on my master's degree I read about oil and gas exploration in the country. I started to document the techniques that had been used and discovered that unconventional drilling techniques, such as hydraulic fracturing, also known as fracking, has been practiced for more than two decades in a small region at the bottom part of the North Island, called Taranaki. Taranaki is described as the center of the country's oil and gas production due to its richness in fossil fuels, and it is a place charged with history and Māori cultural values. Since the first fracking activity began there in 1989, Taranaki has been home to a series of oil and gas explorations that developed a total of 100 fracking operations in 39 different wells operated by companies such as Greymouth Petroleum, Todd Energy Ltd, Origin Energy NZ Ltd, and Tag Oil (PCE 2012). These companies established their presence with well sites and production stations around residential areas and schools, often sharing land with dairy farms. My curiosity and the feeling of connection with the land brought

me to question how one's sense of place and belonging may be affected as the surrounding environment is modified by extraction and environmental degradation occurs.

I first heard about hydraulic fracturing when I lived in the United States, and I had gathered a superficial understanding of the series of impacts and environmental degradation that the practice brings. Minimal ethnographic research had been carried out to understand the social and cultural impacts of hydraulic fracturing in Taranaki, and there was a need to record in general how the petrochemical industry has modified this region and its landscape (see Rehu and Morgan 2012; Loomis 2017; Pollard and Rose 2018). Hydraulic fracturing is an extraction method that revolutionized the oil and gas industry, affecting the world energy trade and geopolitical landscape (De Rijke 2013a). More precisely, hydraulic fracturing is an unconventional extractive practice that combines horizontal and vertical drilling. This technique creates fractures aimed at releasing trapped pockets of oil and gas through the injection of fluid at a high pressure.

Through the years fracking has been widely contested as documentaries and reports raised concerns about the unknown risks linked to this activity. Scientific studies have documented the ecological and human health impacts related to aspects of fracking such as water quality, discharge of toxic substances, and air emissions released during processing (Holzman 2011; Penningroth et al. 2013). This unconventional extractive process has been examined in relation to global energy politics, capitalism, climate change, geopolitics of regional ecotourism, oil exploration, and environmental justice movements (Baer and Singer 2008; Behrends, et al. 2011; Carruthers 2008; Crate and Nuttall 2009; Lerner 2010; Strauss, Rupp, and Love 2013).

Within the discipline of sociology, research on fracking to date focuses mainly on quantitative methods rather than qualitative ethnographic enquiry (e.g., Anderson and Theodori 2009; Brasier et al. 2011; Jacquet and Stedman 2013; Theodori 2009). Less attention has been given to the social and cultural impacts of this practice on the people living close to extraction sites (Perry 2012; Willits et al. 2013; Davidson 2018; Short and Szolucha 2019). As Anna Willow and Sara Wylie emphasize, there is a need for a "new and urgent lens through which to explore the diversity, dynamism, and politics of human environment relationships" (2014:224). Trauma and feelings of uncertainty and anxiety have been reported by those who have considered their experiences of fracking and its resulting impacts. In her study of rural communities in southern Alberta, Debra Davidson (2018) reported the stories of residents who have been living with the trauma caused by toxic contamination due to fracking operations. Her participants

described impacts to their health, land, livestock and loved ones. There are traumas which, as Davidson highlighted, "were then exacerbated by the failure of authorities to respond in a manner expected, and the corrosion of communities" (2018:196). The ecological degradation brought by the intensification of fracking created another "form of trauma, amounting to the severance of intimate personal relationships of a landscape" (Davidson 2018:202). The severance of relationships with the landscape is a form of loss that can bring a disorientation of the self. Similarly, in their work Damien Short and Anna Szolucha (2019:268) identified how communities in Lancashire, UK, experienced a "palpable community collective trauma [during the different stages leading to shale gas extraction operations] from the planning process itself, the various stages of objections and bureaucratic hoops through which concerned citizens have to jump; the feelings of powerlessness in the face of corporate lobbying…" In their interviews the trauma was described by participants as a "sense of powerlessness and feelings of depression, a sense of loss, fear, betrayal, guilt, anger, and an emotional rollercoaster ride of highs and lows as the planning process ebbed and flowed through various stages and the appeal process" (Short and Szolucha 2019:269).

Through the voices of my participants, this project illustrates the diverse feelings and stories regarding the connection people have with their landscape and what emotions fracking has brought into their lives. In this thesis, I explore how people living in different communities in Taranaki experience and perceive the effects of hydraulic fracturing on their lives in terms of risk, anxiety, uncertainty, and threats to their established senses of place.

## Research Objectives, and Questions

My research documents the ways in which members of diverse communities have faced the changes brought by hydraulic fracturing in order to address the following objectives:

1. To understand the complex feelings and experiences of people living in the diverse communities in the region of Taranaki, drawing on interviews that include a wide range of expressed views, from those who view fracking as a harmful practice and those who consider it as a livelihood. These communities include

professionals in the oil and gas sector, community members[2] living near well sites, local farmers, local environmental activists, and experts in the field of resource management and conservation. My objective is to illuminate how fracking affects people's senses of place, as it is expressed in concrete instances of talk.

2. To assess and characterize the feelings evoked by fracking in the affected community, including feelings preliminarily identified by participants as confusion and uncertainty as the practice has spread and intensified through the years;
3. To determine what risks are perceived and experienced by community members in relation to extraction.

Following on these objectives, I formulated a set of research questions:

1. What changes have people seen in the landscape due to fracking and how have they experienced these changes?
2. What are the feelings do people associate with the presence of fracking?
3. Have notions of place, as retrospectively reflected in participants' self-reported changes of attitude, been affected and/or modified by the presence of this activity?
4. What are the perceived risks of fracking, as experienced and reported by the different members of the communities?
5. What are the strategic countermeasures adopted by the members of communities in response to the environmental and social impacts imposed by the intensive practice of the petrochemical industry?

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[2]The term community indicates residents in a specific area, neighborhood, village, or town in Taranaki (Tikorangi, Stratford, New Plymouth, et cetera). When using the term 'community members,' I refer to these categories. Some interviewees indicated their membership in specific groups instead of membership to a community. When this occurs, the group type is indicated:

a) groups closely linked to an individual's profession (for example farmers, engineers, conservationists). In this case, I used the term 'group.'
b) groups sharing a common concern (for example members of activists of grassroots organizations Climate Justice Taranaki, Taranaki Energy Watch). In this case, I used the term 'community group.'

I also take seriously the term 'community,' as found in the interview data—as variously used as a term of group-reference by individual speakers, along with other terms of group and self reference. Of course, this term may be used, elided, or avoided in different ways, by different speakers.

This research finds its roots in an anthropology of energy and contributes to ethnographic studies that emphasize the need for a better understanding of how communities living in fossil fuel dependent regions respond to new or unconventional extractive techniques (see Cartwright 2013; De Rijke 2017; Perry 2012; Willow 2014). The project explores unconventional extractive techniques by considering the historical and contemporary events linked to the petrochemical industry while drawing parallels with research conducted in other areas of the world. This thesis examines the dynamics and opposing views of experts and community members in relation to the risks associated with fracking. I draw from different schools of thought on the definition of risk and how it can affect relationships with the surrounding environment.

Concepts of place, space, and belonging are discussed by adopting a phenomenological lens, inspired by the work and analysis of Keith Basso (1996) and Edward Casey (1996). As will be discussed in following chapters, I claim that the environmental degradation observed and reported by my interviewees resonates with an idea of deterritorialization, as defined by Félix Deleuze and Gilles Gattari (1972) and later re-adapted by Nestor Garcia Canclini (1995) and Valerie Kuletz (1998), as well as the idea of desensitization as a community adapts to the changes occurring around it. In my research, I explore what occurs when ecological modifications happen due to activities beyond one's control. How do the changes in the surrounding landscape affect one's sense of belonging? I argue that, for those living in a constant state of knowing or unknowing what the negative impacts brought by extraction could be, if or when safety procedures go wrong, such uncertainty can create lingering anxiety and/or a sense of detachment to the place as a coping strategy.

Knowing that anthropological engagement with hydraulic fracturing is relatively new among social science researchers, I have sought to contribute to developing a richer body of ethnographic data documenting the socio-cultural impacts. Through my research, I contribute to filling this knowledge gap, and to create a more in-depth understanding of how extraction processes can affect communities and how community members respond (or not) to the associated impacts. I bring a critical analysis of the social implications and consequences of hydraulic fracturing in a geographical area that so far has not been part of wider research in the field.

## Theoretical Background: Ethnography as a Tool Towards the Understanding of Energy and Unconventional Extraction

When considering anthropological engagement with extractive practices, qualitative ethnographic approaches provide an essential perspective in analyzing the impacts of these processes in communities. More than a way of reporting the events and details of experience, the ethnographer attempts to explain 'webs of meanings'and the cultural constructions in which we live. The researcher is called to explain his or her theories, to examine and explain the methodological paths, to reflect on the complex relationships that are activated between the collected data, his or her experiences, and interpretations. Edward Bruner (1997:264) writes: '[e]thnographies are guided by an implicit narrative structure, by a story we tell about the peoples we study" (as cited in Fitzgerald 2007:21).

Through an interdisciplinary approach over the last decade, energy anthropologists have brought new conceptual frameworks as they have "interrogated the forces shaping prevailing high-technology, capital intensive and corporate dominated energy production systems as well as issues of power imbalances, inadequate institutions for energy governance, and local level initiatives that fill governance gaps" (Clarke 2015: 215). Paladino and Simonelli (2013:1) point out that "[d]espite so much good work and detailed knowledge of enduring hazards but fleeting nature of the dominant high risk, high stakes, energy models of today, we remain entrenched in them." Anthropologists now push an urgency and focus of exploring what they define as confusion of 'expert knowledge,' and the continued patterns of human and environmental risks experienced through the trifecta of energy, water, and climate change. Ethnography represents a vital toolkit in elucidating complex phenomena on the social-cultural level and unveiling patterns that may be invisible to demographic and economic analysis. In their work on the BP Deepwater Horizon disaster[3], Diane Austin, Lauren Penney, and Tom McGuire (2017) discuss the struggles often faced by anthropologists and the dismissive attitude adopted, in their case, by BP experts in reducing ethnography to a mere collection of anecdotes. Behind ethnographic methods there is a systematic and scientific approach aimed at recording information, identifing "patterns and regularities in the data, and the constant interweaving of collection and analysis" (Austin,

[3] The BP Deepwater Horizon Oil Spill represents the largest marine oil spill in history. It started on April 20, 2010 caused by an explosion on the Deepwater Horizon oil rig located in the Gulf of Mexico, 66 km off the coast of Louisiana.

Penney, and McGuire 2017:9). As Austin, Penney, and McGuire (2017:14) assert, through ethnography, anthropologists can "uncover complexities and then [help guide] audiences through those complexities to reach conclusions." Thomas Love and Cindy Eisenhour (2016) stress that renewed public interest is leading to an emerging anthropology of energy that needs to conceptualize an interdisciplinary commitment and re-engage the concerns and frameworks that arise. Anthropologists are encouraged to "contribute in public ways to helping the wider public imagine what sorts of new economic as well as political, social and cultural forms might develop around unprecedented, widespread, and already unfolding crises of energy and economy" (Love and Eisenhour 2016:10). Sarah Strauss, Stephanie Rupp, and Thomas Love (2013) discussed how anthropology plays a role in helping document cultural conceptions and assumptions about energy and technology. Anthropologists are positioned to facilitate "the kinds of conceptual and social change that reducing global dependence on fossil fuel will require … the mitigation of social tensions likely to accompany coming energy contraction" (Strauss et al. 2013:11).

Since 2010, anthropologists have studied the social and cultural aspects of unconventional gas developments undertaking qualitative field research among local communities in extraction regions (De Rijke 2017). According to De Rijke (2017:3) in the United States, ethnographic studies have focused "on the diverse societal debates and consequences associated with unconventional gas developments and fracking", addressing political views (Hudgins & Poole 2014), community activism in response to fracking, economic impacts (Pearson 2013; Simonelli 2014), environmental change and place-related identities, and indigenous engagement (Trigger, Keenan, De Rijke, & Rifkin 2014).

Willow's ethnographic work (2014) offers a clear insight into how deterioration of the landscape caused by extractive practices can inflict distress on residents: "[E]nvironmental degradation disrupts geophysical processes and transforms ecosystems extending far beyond the physical environment and into the realm of the social and cultural life" (Willow 2014: 240-241). Referring to the Anishinaabe people in Western Ontario, Willow (2009) discusses how members of the Grassy Narrows First Nation have been deeply impacted by the practice of clear-cutting for decades—an activity that has caused profound modifications of their landscape, threatening their land-based activities and ways of life (Willow 2009). Hunting, gathering berries and rice, and trapping, are part of a "life of land-based subsistence, the cultural identity that accompanies it…" (Willow 2009: 44). The mercury pollution of the Wabigoon River system that occurred in their

area has also affected their economic wellbeing, reducing fishing possibilities and impacting health. Members have shared their anxieties regarding eating wild foods: as Judy DaSilva, activist at Grassy Narrows told Willow, these traditions are "not something you quit. It's not just food for us; it's spiritual" (2009: 44). The Anishinaabe people feel anger that is "directed at a colonial political structure that placed the earnings of powerful industries above the wellbeing of indigenous populations" (Willow 2014: 244). Drawing a parallel, Willow (2014) discusses how individuals living in a region of Ohio where shale energy is extracted through fracking, have also experienced feelings of disempowerment that have changed the way the members of communities see and relate to the environment, from seeing their land devalued to finding themselves unable to keep their children safe from possible harms to disruption of social networks. Residents close to petrochemical facilities express a different anger and are similarly discontented with hydraulic fracturing despite the benefits of increased employment. As one of the residents in Ohio Willow interviewed stresses, it becomes horrifying to know how the knowledge linked to the land could be disappearing, instead of being protected: "[t]he only entities that have any control over this are the oil and gas industry and the state government" (Willow 2014: 247).

Exploring the place-based perceptions of the impacts of hydraulic fracturing along the Marcellus Shale, Sangaamoorthy et al. (2016:32) documented how residents experienced tensions with their neighbors due to disputes arising from mineral rights and surface property. Residents stated that these tensions were even more present with companies as oil and gas development operations started, pointing to "substantial differences between the drilling of the past and fracking" (Sangaamoorthy et al. 2016: 32). Often relationships were described as symbiotic: owners would get money; companies would get gas. Environmental disruption was minimal. However, as one long-term resident and surface owner told, the current situation is no longer based on a symbiotic relationship or understanding. Leases agreed to by companies become a way to "devastate and destroy [the] property while the gas companies get the benefit" (Sangaamorthy et al. 2016:32). In the United States under common law "mineral rights trump surface rights, and surface rights owners have to allow the necessary use of surface property" (Sangaamorthy et al. 2016:32). In regions such as West Virginia compensations to cover surface damages for surface owners are offered under the state legislation (Collins and Nkansah n.d.). In another example given by Sangaamoorthy et al. (2016:32), a resident expressed his concern on

how the trusting relationships built with local oil and gas companies are often destroyed because of multi-national companies' interests often leading to the small enterprises' failure: "It takes a quarter million to drill a well; your little mom-and-pop drilling companies can't afford it. Their kids went to school with our kids. They had a vested interest in the community."

Elizabeth Cartwritght (2013) analyzes the idea of 'eco-risk,' a notion that of risk itself that I will explore more in depth later in Chapter Six of this thesis. By making a parallel between individual bodies and a biological circulatory system, Cartwright tries to explain how and why fracking is a contested technology. Cartwright brings readers toward what Strauss, Rupp, and Love (2013:27) define as 'the anthropology of the unknown, the invisible, the just beyond the senses" as she delves into exploring the connections of health, environment, and culture in areas of United States where the impacts of hydraulic fracturing or fracking are becoming apparent. For Cartwright, risk is the outcome of a process of tacking back and forth "between locally perceived dangers, the technologies of perceptions used to quantify/make visible/threat those dangers, and the laws used to regulate practices surrounding what is perceived to be risky" (Cartwright 2013:211). This negotiation back and forth is played out against an environmental background. Cartwright discusses the embodied experiences of physical sensations, (well-being, health, illness, etc.) and how the sensorial meanings that are often attributed to a place (how it smells, how it looks, etc.) "play into the process of giving meaning to how it has been polluted" (Cartwright 2013:208).

Jessica Smith and Mette High (2014:3) assert the use of ethnographic tools and methods within energy research to shed light on the human condition and provide a more in-depth grasp of our relation with energy:

> [w]hen we apply an ethnographic gaze, social life emerges with all its implicit and explicit relations, untold rules of thumb and self-aware sensitivities, underlying assumptions and clear intuitions, shared world views and conflicts of interest. A plethora of habits, rules, norms and constraints appear. Seeking to understand this ethnographically involves an 'important bridge between macro and micro perspectives'(O'Reilly 2012:7).

An important point raised in their discussion is that the epistemological differences between those who seek to inquire of reality as constructed by each individual and those who see a reality external to us.

Appel, Mason, and Watts (2015) stress the difficulty of grasping the full range of the interconnections in the fossil fuel sector when commencing a study of the social aspects of

fracking and oil and gas development, especially for those scholars entering the world of oil and gas:

> The scale and reach of the [oil and gas] sector is in fact almost impossible to grasp fully in part because of the difficulty of deciding on its circumference and limits…To enter this world as a scholar, or indeed as a lay person, is an unsettling and, in some respects, a deeply confusing experience. Immersion in the world of oil and gas tends to produce a profound sense of intellectual vertigo … Even narrowly construed, a critical topography of the [oil and gas assemblage] must include supermajors, national oil companies, service companies, and a massive oil infrastructure; regulatory agencies and governance institutions including commodity exchanges and newly emerging global governance mechanisms such as the International Energy Forum; petro-states, massive engineering companies, and financial groups, shadow economies (theft, money laundering, drugs, organized crime), the rafts of NGOs (human rights organization s, monitoring agencies, corporate social responsibility groups, voluntary regulatory agencies), research institutes and lobbying groups; landscapes of oil consumption (from SUV s to pharmaceuticals to agriculture), oil communities from Houston to Baku to the Niger Delta, military and paramilitary groups, and the social movements that surround the operation of, and shape the functioning of, the industry. And this is only a start. (Appel, Mason, and Watts 2015: 7-8, as cited in De Rijke 2017:5)

In his work, Kim De Rijke (2013;2017) investigates the dynamics created by hydraulic fracturing, looking at its effect on water quality and usage. Based in Darling Downs in Queensland, Australia, he describes the area as "a renowned agricultural region with dark, fertile clay soils where cotton, cattle, legumes, and vegetables are produced" (De Rijike 2017: 2). Since 2009, expansion of the unconventional gas industry in the area has led to controversy with regards to its effect on farmers and their crops. Here, industries have aimed to "extract large reserves of natural gas located in the cleats and pores of coal seams … The extraction of such gas requires numerous wells to be drilled over relatively large areas … While each well pad has a relatively small footprint of about 1ha or less, the collective footprint … is significant" (De Rijike 2017:2-3). Hydraulic fracturing requires large quantities of water to transport the extracted gas and oil to the surface. This water is known as a "by-product, as wastewater, or as "(co-)produced" water (e.g., Hamawand, Yusaf, & Hamawand, 2013; Towler et al., 2016), and that can "contain contaminants hazardous to human and environmental health" (De Rijke 2017:2).

However, De Rijke (2017:5), has criticized recent studies: "[a]nthropological work on fracking to date has insufficiently engaged with the technology in its global, corporate, scientific and historical contexts," creating a gap of knowledge within and between communities. By emphasizing more interdisciplinary research with geologists, engineers, hydrologists and experts,

De Rijke (2017) stressed that this cooperation could facilitate a more informed understanding of fracking.

My research takes into account the need to gather comprehensive knowledge on fracking from different views and sides of the story by building upon existing anthropological work and addressing the insufficient engagement with a wider pool of experts. In this way, my research is "up, down and sideways" as Nader (2013) would say and allows a more complete picture of "the complex dynamics of contemporary hydrocarbon developments" (De Rijke 2017). As Nader (1969:9) stressed in her essay "Up the Anthropologist: Perspectives Gained from Studying Up," researching and posing "the problems in a comparative frame would help improve our chances for understanding the forces that generate" specific dynamics and grasp what shapes society itself.

## Dissertation Outline[4]

In **Chapter Two** I set the stage by describing the historical and geographical context of the region, briefly delineating the economic sectors and industries and outlining the oil and gas sites that I visited during my research and the companies operating in the area. The landscape has the role of protagonist in the dissertation and stays in the foreground.

In **Chapter Three** I discuss the methodologies and approaches used during my ethnographic fieldwork. Through a reflexive approach, I present the limitations encountered and discuss the events occurring in the region and in the country in relation to changes in oil and gas exploration as well as the policies that shaped the project and future research endeavours.

In **Chapter Four,** I present narratives of place and belonging, and provide an overview of the concepts and meanings attached to these notions. This chapter represents the core of my research findings and analysis: by drawing from similar case studies linked to extraction, I present themes and patterns to shed light on how senses of place has been impacted by the presence of petrochemical facilities and hydraulic fracturing operations. This discussion ties in the notions of desensitization, deterritorialization, and the concept of *solastalgia* (Albrecht 2003),

[4] In the structure of my dissertation, I chose to interweave theoretical discussion with my ethnographic data to create a flow in the narratives I collected and presented. As an example, I do this in Chapter Six where I provide a theoretical framework on risk.

that is, the existential distress evoked by environmental change, as the result of the experiences lived by my interviewees.

**Chapter Five** offers a brief historical account of hydraulic fracturing, explaining the technical aspects and bringing an in-depth discussion of the history of oil and gas in New Zealand. I discuss the current regulations by which petrochemical companies must abide and the roles of local councils and companies with respect to these rules and present narratives related to issues and perceptions of regulations in the region.

**Chapter Six** focusses on narratives regarding risks and concerns linked to hydraulic fracturing and the recurring themes that arose in conversation with my interviewees. I present these narratives in parallel with the existing scientific literature on the environmental and health risks. But first, I first provide a theoretical framework for the concept of risk, and I discuss how the ways participants have reported their concerns about risks to me has in turn shaped my own understanding of the concept. I draw from three lines of thought: a cultural symbolic approach; a psychometric paradigm; and a risk society approach. This discussion ties into my interviewees' lived experience of risk, and their feelings of uncertainty and anxiety when addressing their concerns toward the industry and hydraulic fracturing operations.

**Chapter Seven** documents community resistance to the oil and gas developments in Taranaki and gives consideration to activist movements and reactions that have arisen in response to intensification of extractive practices. I present the steps taken by community members and close interviewees, drawing parallels between their actions and those taken in other regions of the world, given the often-consequential degradation of physical space. I discuss grassroots movements that have been developed in the Taranaki region through community groups such as Climate Justice Taranaki (CJT), Taranaki Energy Watch (TEW), and Kiwis Against Seabed Mining (KASM). This discussion offers an additional lens of analysis in understanding how hydraulic fracturing and the petrochemical industry are perceived by the wider community, and it addresses the question of what types of strategies have been adopted by those opposing fossil fuel extractive processes in Taranaki.

Finally, **Chapter Eight** provides a summary of my argument, gathering the salient points that emerged through my conversations with my interviewees and their points of view. This chapter also brings reflections on the research into focus and makes suggestions for future work on the topic.

# CHAPTER TWO: SETTINGS

In Spring 2017, I began planning a preliminary fieldwork phase of the duration of a few months. This phase represented a starting point in engaging with community members, to establish initial rapport. It also gave me an opportunity to gain a sense of the landscape, to gauge the presence of the oil and gas industry in the region and to begin to consider the dynamics of various groups living in Taranaki. Fieldwork is never easy it can be rather challenging, exhausting, and bringing often t, face a series of complications. Anthropologists have recognized and embraced this uncertainty through the practice of fieldwork. Judith Okely (2012: 56) reports how Ulrich Beck (1998) and others have "associated uncertainty with the crumbling of predictability in a postmodern age; uncertainty and creative chaos have been integral" aspects of anthropological research. Martyn Hammersley and Paul Atkinson (2005:20-21) stress how "the course of ethnographic work cannot be predetermined, all problems anticipated, and ready-made strategies made available for dealing with them." The researcher must learn tips on how to adapt to the sudden changes and shifts which often occur in a blink of an eye, by taking what they define as "the line of least resistance" (Hammersley and Atkinson 2005: 21). This is something I kept in mind as my project continued, and that I would later discuss in my reflections for this chapter.

I began my travels on November 3rd, leaving from Milan, Italy, on a direct flight to New Zealand. After almost two days of travelling, I arrived in Auckland. My next flight to New Plymouth was scheduled for later the same day, in the early afternoon. Due to high winds in Taranaki, air traffic controllers initially decided to postpone the flight and later cancelled it. These unexpected circumstances brought me to rearrange my fieldwork schedule, to find last-minute accommodation in a motel not far from Auckland airport. I contacted one of my contacts at the time, who had offered hospitality to me during this phase of fieldwork. I communicated to her the delay of my arrival, and she promptly explained how common it is, and to expect that for the future fieldwork phases as well. It started to become clearer to me how the landscape of Taranaki, its morphology and weather, would play an important role throughout my project. It became an additional participant in my research, and not just an element of analysis and part of the social dynamics created around well sites or production stations. As my project focuses on how senses of place and belonging are shaped by the changes in the landscape, it becomes then essential for me to offer a description of the geography of Taranaki. In the next section, I will

therefore discuss some historical, economic, and geographic elements of the region while delineating a map of the specific locations I travelled through, and the places partly shaped by the presence of the oil and gas industry.

## Description of Taranaki Region and its History

*History.* Taranaki can be considered an area that has been marked by conflict with the Crown since 1834 and has been further animated by forms of activism and protest since the signing of Te Tiriti o Waitangi in 1840. The Treaty of Waitangi represented a milestone for the creation of New Zealand. The document at first seemed to seal a shared authority between the British Crown and Māori but was not signed by the Rangatira of the resident iwi of the Taranaki region. The approximately 43 chiefs[5] or rangatira were the first Māori signatories to the first signed version of the document, which consisted of three articles written in te reo Māori. While some versions circulated for signatures are set out in both English and te reo Māori, "the majority of Māori representatives signed the Māori version, which does not directly correspond with the English version" (Wyeth et al. 2010:305). The ambiguous translation and the personal interpretation made by the British colonists created a fundamental deception that would later weigh on the relations between natives and colonizers. As Māori scholar Ranginui Walker (1984) pointed out, there were inappropriate translations of key words making its legality contested by many as well as improprieties pursued by the Crown:

> [t]he word mana, the only Māori equivalent to the concept of 'sovereignty', was not used in the first clause. The word kāwanatanga ('governance') was substituted for mana, so the chiefs were asked to cede kāwanatanga, the unknown concept of 'governance', of their lands to the Crown. The word kāwanatanga obfuscates the meaning of the treaty because it is a missionary transliteration of governance (Ross 1972:20), a word which appears in the order of the morning service ("that all our doings be ordered by thy governance"). Thus the word kāwanatanga used in the missionary language of prayer appeared to be a harmless, indeed benign, term, when what it stood for was mana. Had the word mana been used, then the purpose of the treaty as an instrument ceding sovereignty would have been absolutely clear. (Walker 1984:268)

[5] This number refers to the Māori chiefs who signed on 6 February 1840. As reported on the New Zealand History Government (2017) website, following the first meeting, "copies of the Treaty were then taken all around the country, and chiefs from many places signed. There were about 50 signing meetings between February and September 1840 and about 540 chiefs gave their agreement. All but 39 chiefs signed a Māori-language copy of the Treaty."

While the English version indicated unconditional imposition and control by British sovereignty, the Māori text pointed to retaining the territorial authority by the Māori while leaving the Crown a controlling role in all matters arising with the Pakeha. Walker (1984:269) stated "the difficulties of living out that ideal soon became apparent, as two races of vastly different cultural traditions competed for the land and its resources." The British government insisted in placing all Māori under British authority, despite many chiefs not agreeing to the treaty and refusing to sign it (Walker 1984). Tensions began to rise: three years after Hobson's statement at Waitangi of Māori and Pakeha being "one people" violence between settlers and Māori broke at Wairau, on the South Island. In 1843 British colonists tried to expropriate land from Māori by displaying false permits. This episode along with war in Northland were precursors to more serious battles known as the "Land Wars" that saw Māori fighting against the improper sale and confiscation of their land.

In Taranaki, the first clash between Māori and British troops had occurred before the signing of the Treaty, in 1834, after the shipwreck of John Guard's trading vessel, the *Harriet*, near Rahotu. The survivors, including several members of the crew and Guard's children, were captured by local Māori and held for ransom. The 50th Regiment was sent to rescue the hostages, eventually freeing them, but resulting in the violent punishment and killing of many Māori and the bombardment and burning of two major settlements (Lambert 2009).

In the 1850s, clashes between Pakeha settlers and Māori increased across the island due to land sales and the discontent and injustices perpretrated against Māori for control of their land (Belich 2015). In this period, in Taranaki "feuding broke out between the land-selling minority of the local Atiawa tribe, led by Ihaia, and the anti-land-selling majority, led by Wiremu Kingi…" (Belich 2015:159). The situation escalated as a faction of local Māori offered to sell the Pekapeka block at Waitara, although several Māori opposed the sale. The opposition ignored the ultimatum given by the British Crown to the army, to occupy the block, resulting in the first Taranaki war commencing on March 17, 1860. As James Belich (2015:159) reported:

> In 1859, a third chief, Teira, offered to sell the British 600 acres at Waitara, and Kingi, who was generally recognized as the senior Atiawa tribal chief, vetoed the sale. Teira's offer, however, was accepted by Governor Thomas Gore Browne, who had succeeded Grey in 1855. Browne was aware that Kingi might resist, but he nevertheless felt compelled to proceed with the 'purchase' and occupation of Waitara. War consequently broke out on 17 March 1860 and lasted for one year. Te Atiawa fought unaided for a little more than a week. After this, Kingi was supported by the Ngati Ruanui and Taranaki

tribes, and within a month operations were dominated by the prospect and reality of Kingite intervention.

From 1860 to 1881, Māori and Pakeha faced periodic fighting, in a sequence of wars, that can be divided into three phases, as outlined by Lambert (2009) and Belich (2015):

1. 1860-1861: First war fought mainly around New Plymouth and Waitara. A truce was called in March 1861, but it did not resolve the situation.
2. 1863-1866: The Crown occupied the Tataraimaka block west of New Plymouth. During this time, Taranaki leader Te Ua Haumanene founded the Pai Marire faith, a religion that blended aspects of the Old Testament with Māori traditions. The government forces and Pai Marire adherents fought a series of battles. By 1866, the Crown captured Te Ua, who died soon after. The creation of the New Zealand Settlements Act 1863 allowed the Crown to enable confiscation of land from the so-called rebels. The confiscated land was made available to Pakeha settlers and no compensation was given to non-combatant Māori. More than 800,000 hectares of land was seized through this action.
3. 1868–69: When South Taranaki iwi responded to the constant Pakeha occupation of their land, the Titokawaru's war began, led by Riwha Titokowaru. After a series of defeats, in 1868 Pakeha were able to regain control. The war came to an end in mid-1869 (Lambert 2009; Belich 2015).

A different approach to the conflict was being taken at the settlement of Parihaka. In this small village located near Pungarehu, approximately seven kilometers from the coast, Te Whiti-o-Rongomai and Tohu Kakahi led a peaceful resistance campaign against land confiscations. Te Whiti o Rongomai and Tohu Kakahi were considered spiritual leaders and founders of the village of Parihaka, created as "response to the displacement of Māori from their land caused by the enforcement of the New Zealand Settlements Act, which allowed for the confiscation of native land from tribes considered to be in rebellion against the British Crown." (Kensinger 2013:1). A self-sufficient community, Parihaka became "a refuge and haven for thousands of Māori dispossessed and made homeless by land confiscations throughout New Zealand" (Lambert 2009:1). In 1879, "men from Parihaka began ploughing and fencing land occupied by settlers. Over the following months the ploughing campaign humiliated and frustrated the government" (Lambert 2009:1). Paula Savage (2006:13) states that Te Whiti and Tohu Kakahi's followers

"removed the survey pegs, ploughed, planted and erected fences on the surveyed land, and undertook long silent marches around their coastal tribal boundaries in a symbolic assertion of ownership and eloquent protest against the alienation of their land." As a result, many ploughmen were arrested and jailed without trial. On November 5th, 1881, members and volunteers of the Constabulary Field Force invaded Parihaka destroying houses and arresting Te Whiti o Rongomai and Tohu Kakahi. There was no resistance from Māori toward the British crown. Special laws were enacted to allow the Crown to imprison the ploughmen of Parihaka without trial. The whole of the Taranaki province was confiscated and Te Whiti and Tohu's "utopian dream of a new social order for Māori and Pakeha based on respect, equity, peace and harmony was never realized in their lifetime" (Savage 2006:13).

After the confiscation of Parihaka lands, the landscape changed. Tihikura Hohaia, a member of Pakihaka, said in an interview in 2014:

> "The forests were the first things to go, and with them the birds, one of our kai sources. … Our natural environment was wiped out…we became economically dependent on our colonisers. Our people would go out and get work planting grass seed on the farms." Tihikura explained that after the loss of land-based food sources, the community depended on waterways instead for their food – especially rivers, streams and reefs. … ''What I'm experiencing now as a Māori man, growing up in my home area, feeling powerless, I'm not the only person experiencing that. We are all the inheritors of the history of confiscation" (Caritas 2014:1).

Parihaka's legacy continues to inspire peaceful protest movements occurring around the country, including, most significantly, the Maori Land March, and the several very significant hikoi that followerd, including the Tainui Awiro hikoi and actions led by Evan Rickard in the 1960s and 1970s and the Takaparawha (Bastion Point) reoccupation by Ngati Whatua and the Orakei Māori Action Committee.

In the preliminary phase of fieldwork, I had the chance to be welcomed in the community of Parihaka, originally founded in 1866 by Māori leaders Te Whiti o Rongomai and Tohu Kākahi. Every month, on the 18th, the community hosts a pōwhiri or mihi whakatau at the three different marae. The meeting consisted of discussing kaupapa relevant to Parihaka, as well as critical issues facing their iwi/hapū/whānau nationally and internationally. There I had the opportunity to briefly introduce my project with the hope of getting in touch with members of Māori communities to eventually include their perspective on the extractive practice as well.

When I visited Parihaka, I witnessed the legacy of the teachings of Te Whiti and Tohu Kakahi and the harmony created. Several communities exist on the three marae[6] and it was a unique opportunity for me to meet people with different stories yet sharing a common goal Sitting at one of the tables during the potluck, I had conversations with individuals whose families have been linked to Parihaka for generations and others who were visitors attempting to gather a deeper understanding of the place. Later, when I participated in one of the meetings at the main marae, it was explained to me how members are concerned with aspects related to their natural resources (including black and white gold)[7] and how to be active kaitiaki of their landscape. The story of Parihaka's non-violent resistance to colonial encroachment of their lands represented a significant moment in the history of indigenous activism and has inspired other communities around the world. "Parihaka is paradoxically one of the most shameful episodes and one of the most remarkable and enduring stories in New Zealand's colonial history" (Savage 2006:12). Te Whiti o Rongomai and Tohu Kakahi, along with the people of Parihaka, were able to resist and protest injustices through a peaceful and yet powerful stance "in a world turned upside down by European colonization" (Savage 2006:12). The events that took place during the land wars affected the political, cultural, and spiritual dynamics of the entire country. Nowadays, at Parihaka, the community follows a tradition started by Te Whiti and Tohu by meeting on the 18th and 19th of each month to discuss current issues. The meeting serves as a moment to gather together, welcome visitors from around the world, and look for common actions to be taken for the wellbeing of the community "in a spiritual quest for self-knowledge, inner peace and harmony gather together" (Savage 2006:12)**.**

*Economy.* Farming and energy production are the principal sector that characterize the regional economy. The soil's fertility and abundant rainfall have created the ideal conditions for dairy farming, making the region the first specialised dairying area in New Zealand:

> Early settlers were prosperous due to the productivity of the land. As the market for butter and cheese in Britain expanded in the 1870s and 1880s, so did the dairying industry and population. Taranaki's dairying industry grew fastest of all dairying

[6] Marae are used for meetings, workshops, celebrations, and other tribal events. They represent a communal and sacred meeting grounds, "the forums where tikanga or customs are performed, discussed or negotiated. Marae are the focal point where values of stewardship and management in relation to the environment and to people are grounded" (Kawharu 2010: 221).

[7] The term 'white gold' is a term used throughout the Taranaki region and New Zealand to indicate the dairy industry and milk production (Cairns 2011). My interviewees often used this distinction when discussing dairy operations and oil and gas companies.

> regions between 1886 and the early 1910s. Dairy exports achieved greatest significance in the 1920s, but Taranaki's climate and land, while suitable for dairying, is too wet for sheep farming compared with the drier areas on the east coast…Many of Taranaki's factories specialised in cheese production, which, being made from whole milk, had to be drawn from a compact supply area (Len 1999: 24-25).

As of 2020, Taranaki comprises 3 percent of New Zealand's total GDP, with the Dairy Cattle Farming industry as the largest employer. The dairy sector's contribution to New Zealand's total GDP (gross domestic product) was 10.2 billion (Dairy NZ 2020). In 2020, dairy farming was reported to employ "3,221 persons and accounting for 5.4% of total employment in the district" (Venture Taranaki 2020:15). Fonterra represents the largest dairy company in New Zealand and as Ron Lambert (2016) reports "had part of its origins in the small local dairy cooperatives of 19th-century Taranaki, which amalgamated with one another over time." In 2001, Kiwi Dairies, a dairy company in Taranaki merged with the Waikato-based New Zealand Dairy Group to form Fonterra. Fonterra is a cooperative owned by its 11,000 farmers, "generat[ing] 20 percent of New Zealand's export receipts and 7 percent of its GDP. It produces and exports commodities to 140 countries and is responsible for a third of international dairy trade" (Chisholm 2009:22).[89]

As for the mining sector, the Kapuni and Maui gas fields have been major suppliers of employment since the 1960s. Between 2019 and 2020, mining made the largest contribution to overall growth in the Taranaki Region between 2019 and 2020. The industry grew by 10% over the year and contributed 1.58 percentage points to the district's total growth of 2.6% (Venture Taranaki 2020).

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[8] Lesley Pitt (2013) reports the dairy industry brings an environmental cost to the country and the region of Taranaki. In 2012, Greenpeace noted that the dairy industry has been causing an increase of "gas emissions from the agricultural sector since 1990' (para.1) [as cited in Pitt 2013:54]. Historically, dairy industry practices have been found responsible for polluting waterways by dumping discharge into the streams. Pitt (2013:54) stresses that "in 1981 a claim was made by the Te Āti Awa people to the Waitangi Tribunal about the, 'discharge of sewage and industrial waste into the sea between New Plymouth and Waitara' (Waitangi Tribunal 1983: para. 1) and the claim was upheld by the tribunal." Despite attempts made by the dairy industry to adopt more sustainable practices and stricter rules, episodes of pollution and breaching of regulations by farmers are recurrent (Shaskey 2018). In 2019, Greenpeace NZ defined the dairy industry as the dirtiest in the country after the Ministry for the Environment and Stats NZ released a report indicating the state of New Zealand environment. This report painted an unfortunate and bleak picture of biodiversity loss and polluted waterways (Ministry for the Environment and Stats NZ 2019) and indicated how the farming and dairy industry have contributed to it.

[9] During my fieldwork, there were occasions where my participants would point out the environmental degradation caused by the dairy industry in the region. As my research focuses on a sense of place, the risks related to hydraulic fracturing, and documentation of people's experiences linked specifically to this practice, I did not fully investigate dairy farming as this topic is beyond the scope of this project. However, I do offer a brief overview on dairying in New Zealand and some of its impacts on the landscape.

While tourism is considered as “New Zealand's biggest export industry, contributing 20.1% of total exports” (Tourism New Zealand 2020:1), tourism numbers are relatively small compared to other regions, partially due to its location (Venture Taranaki 2020). However, tourism has been growing in the region reaching “the 2.4% of the Taranaki Region's economic output in 2020, up from 1.3% ten years ago,” employing an average of 3,363 people in the region (Venture Taranaki 2020:44).

*Topography.*Taranaki is a small region occupying a surface area of 7,258 square kilometers, projecting into the Tasman Sea and located in the southwest part of the North Island. The region has a variable geology, extending into “hill country to the East, and to the marine terrace formations to the south and … the north” (Taranaki Regional Council 2012). Taranaki’s boundaries are delineated by the Mohakatino River catchment up north and the Waitotara River catchment down south; rivers cover around 1,570 km of the area, while lakes extend for up to 154 km. The region is rich in freshwater aquifers, lakes and wetlands, supporting “a range of freshwater habitats and ecosystems” (TRC 2013:1). These bodies of water are known not only for their scenic and aesthetic value and the recreational experiences available to locals and tourists, but also for economic and commercial purposes. Water represents a necessary component for the success of many industrial and agricultural operations, along with hydraulic fracturing (TRC 2012). Petrochemical facilities such as Kapuni production station and Methanex, heavily rely on water for the completion of many of their activities. Popular rivers and streams in the region include the Kaupokonui River, Oakura River, Patea River, Urenui River, Waingongoro River, Manganui River, Waiwhakaiho River (Ministry for the Environment n.d.). Just south of New Plymouth, the only major city in Taranaki, we find Lake Mangamahoe, while not so far from Eltham, Lake Rotokare (the rippling lake in te reo Māori), occupies an area of 212 hectares, and it represents an important stopover for various migrating species (Venture Taranaki n.d.). Lake Rotorangi was created when a hydroelectric dam was built on the Patea River. The map below shows some of the major water bodies and streams mentioned above.

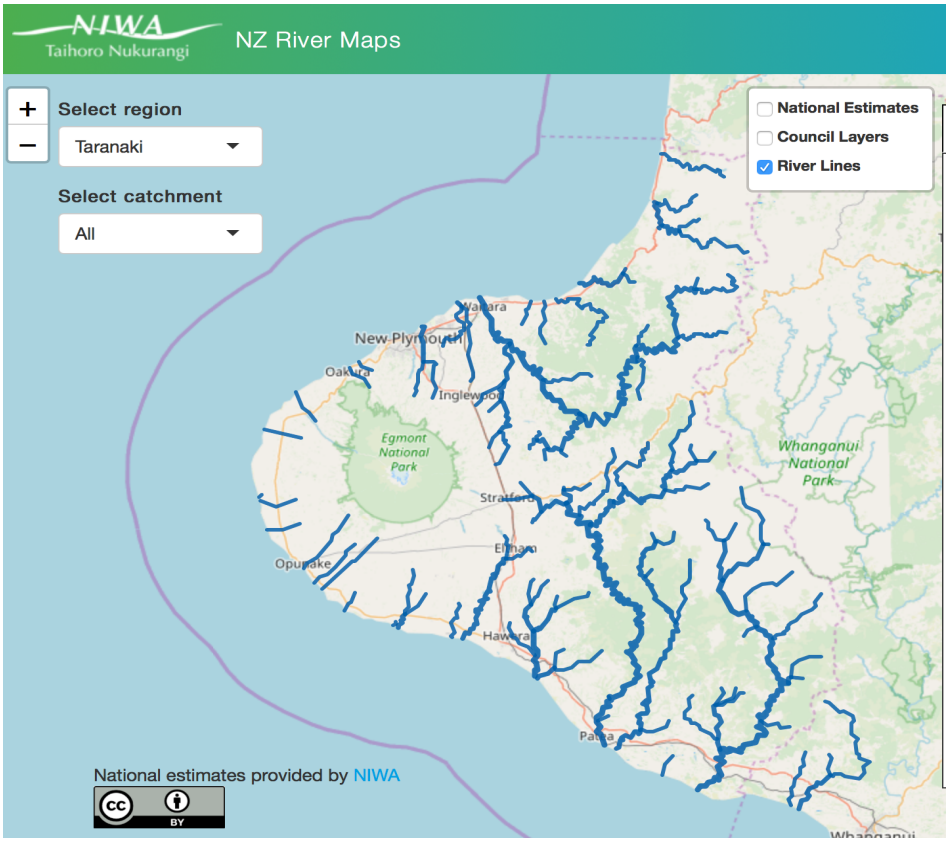



*Figure 1: Map adapted from NIWA-NZ River Maps*

The dominant feature of the landscape, however, is Taranaki Maunga (2, 518 m), the second-highest mountain on the North Island. A well-known landmark, similar in appearance to Mt Fujiyama in Japan, Taranaki is a composite cone or strato-volcano, considered one of the most symmetrical volcanoes in the world (Geological and Nuclear Science 2017). A dormant volcano, Taranaki Mounga[10] represents the "latest of a sequence of volcanoes that lie on a north-west to southeast axis across Taranaki, and that have formed the province through their eruptions" (Te Ara n.d.). As Lambert (2015) describes, the centres belong to the same volcanic structure:

> Once established, each volcanic centre began to erode and was eventually supplanted by a new centre, whose eruptions overtopped the landscape created by the earlier volcano. The first volcanic centre survives as the heavily eroded Sugar Loaf Islands (Ngā Motu); nearby Paritutū was probably extruded in much the form it exists in today. The next volcanic centre was the Kaitake Range, last active around 575,000 years ago. Pouākai was last active more than 200,000 years ago, whereas the last eruption of Mt Taranaki was no more than 250 years ago. Lava deposits from Taranaki's eruptions have mostly buried

[10] In the dialect of the Taranaki iwi, it is pronounced Mounga, rather than Maunga. Both spellings and pronunciations are acceptable.

> those of the earlier volcanic centres. Fanthams Peak, just south of Taranaki's main summit, will at some point replace it.

As M.S. McGlone, V.E. Neall, and B.D. Clarkson (1988) have reported through pollen records, Taranaki Mounga has erupted at least nine times since about 1500 A.D and its last eruption occurred no more than 250 years ago and is very likely to erupt again (GNS 2017). The mountain represents a vital and important feature of the region. For this reason, Taranaki is described as an 'outstanding natural feature,' a term used to define those natural landforms and geological features of international and national importance (New Plymouth District Council n.d.: 1):

> It is important to protect the values of these features and landscapes for continued enjoyment and appreciation by the community. In particular, ethical stewardship is important to ensure the cultural, spiritual and historical significance of these features and landscapes to iwi is maintained and enhanced.

*Figure 2: View of Mount Taranaki from Okato, South Taranaki*[11]

All the iwi and their land circle around the mountain. Travelling to the north, we encounter Te Atiawa, Ngati Mutunga, and Ngati Tama. Ngaa Rauru, Ngati Ruanui (including Pakakohi,

[11] All photographs are by the author, except where otherwise indicated.

Tangahoe), and NgaRuahini (Ngāwhare-Pounamu 2014). Following, as shown in figure 3, the lands of Taranaki iw, extend along "the coastal and mountain area between Ōuri and the Rāwa o Turi stream in the south and Ōnukutaipari in the north" (TRC n.d.). North-east of the mountain are the Ngati Maru.

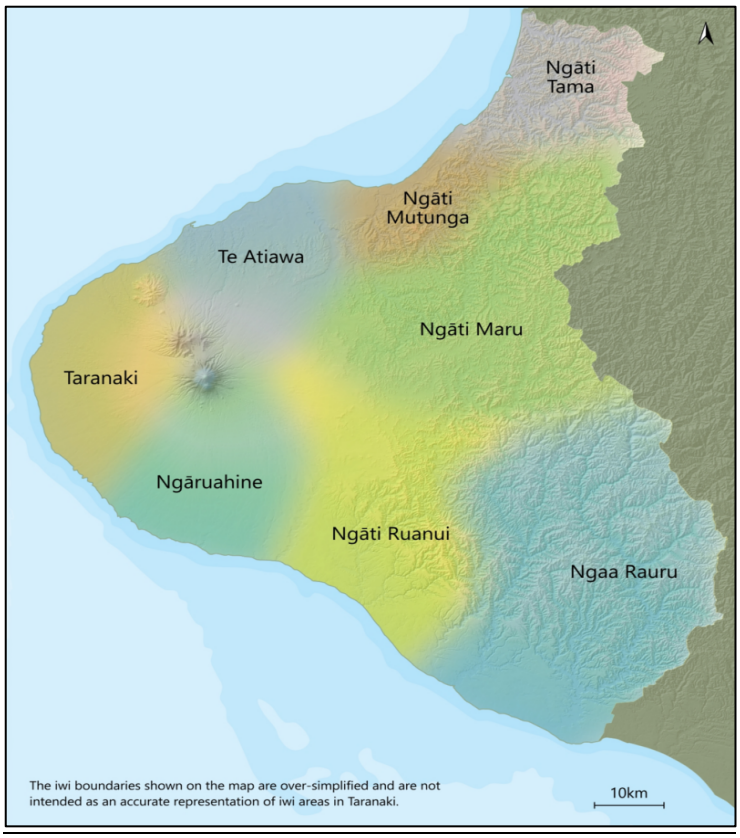



*Figure 3: Map showing iwi boundaries.* *Adapted from: Taranaki Regional Council (TRC), n.d.*

This promontory is charged with Māori history and values, and it was the focal point of many of my conversations with participants in my project, in which they narrated the stories around the mountain and their connection toward it.

As reported through the Taranaki Mounga Project, a collaboration between the Department of Conservation (DOC) and eight Taranaki iwi, according to Māori traditions, Taranaki's name derived from Ruataranaki, ancestor of the Taranaki tribe, who as soon as the mountain became a steadily geographical landmark of the region, "travelled high up to the source of the Hangatahua River where he ceremonially anchored the mountain to have his name placed on its slopes" (Taranaki Mounga Project. 2016:1). My initial understanding of the legends

surrounding the mountain came from the work done by Stephenson Percy Smith, ethnologist and surveyor, known for his account of the origins of Māori and their arrival in New Zealand. The accounts from surveyors like Smith have contributed to gather a lot of information and made it accessible to other Pakeha (Ngāwhare–Pounamu 2014: 87). As Dennis Ngāwhare–Pounamu (2014) discusses in his doctoral dissertation, "Smith [like the others Pakeha surveyors, received] his information by Te Kāhui Kararehe in Te Reo Māori and subsequently translated that kōrero into English" (2014:19). The term 'Pūkōrero,'according to Ngāwhare–Pounamu (2014:34) refers to "the primary informant that gave oral information to an author, who then published that information" (Ngāwhare–Pounamu 2014:34). Three are the pūkōrero that related the origins of the Travelling Mountain Narrative and Taranaki tribal traditions: Te Kahui Kararehe (Ngåti Haupoto), Taurua Minarapa (Ngāti Haupoto) and Minarapa Kahukura Makuru (Nga Mahanga) (Ngāwhare–Pounamu 2014: 35). The relationships between the pūkōrero and the Pakeha as the published authors of tribal traditions "indicate a power imbalance between primary sources and published authors" (Ngāwhare–Pounamu 2014: 212). Through the years, Smith's work has been heavily criticized for the use of his source material and Māori translation (Byrnes 1993), as well as the work of Best (1899;1924) and William H. Skinner (n.d.). Skinner, Smith, and Best were all government surveyors, and self-taught ethnologists (Ngāwhare–Pounamu 2014: 75):

> There may have been different reasons why these men were collecting and publishing tribal traditions, but the power imbalance between them and the pukorero is redolent of colonialism […] They were products of their generation and whilst on one hand they were implicit in the dispossession of Maori land, on the other hand they were concerned with collecting and preserving Maori knowledge. (Ngāwhare–Pounamu 2014: 82)

Smith narrated how Taranaki is described as belonging to a group of seven mountains considered to be gods and warriors[12]:

> *Mount Egmont (Taranaki) once lived in the neighbourhood of Tongariro mountain, in the centre of the North Island, whose wife was Pihanga—that graceful wooded mountain, with crater near its top, now filled with water. Taranaki fell in love with the Lady Pihanga, much to the wrath of Tongariro, who ordered him to leave, enforcing his command with so powerful a kick, that Taranaki was driven away to the west. In his flight he followed down the course of what is now the Manga-nui-te-au branch of the*

[12] The full quotations from Smith's account I report here are part of what Ngāwhare–Pounamu describes as the Travelling Mountain Narrative. As he discusses in his work, accounts like the one presented above were the result of a symbiotic relationship between pūkōrero and kaitauaki Pakeha which "demonstrated a power imbalance. It was the Pākehā who published, who became famous and therefore who profited from this information they recorded. This led to the construction of grand narratives by Percy Smith and Best by fusing elements from different tribal traditions in order to create a cohesive history of Māori" (Ngāwhare–Pounamu 2014:87).

*Whanganui river, opening up its course down to the main river. Then, in his flight, scouring out the Whanganui river itself. At about ten miles seaward of the Ohura junction there is a group of rocks in the Whanganui river, said to have been dropped by Mount Egmont in his hasty flight. Again, inland of Wai-totara, are other rocks dropped in the same manner. From this place he came westwards as far as the great Ngaere swamp, where he rested, and by his great weight made a depression in the ground, since filled by the swamp. "Continuing his journey,"says Mr. Skinnor, "he arrived just at dark, at the south-east end of the Pou-a-kai ranges, which had been in their present position ages before Mount Egmont arrived. Having arrived at Pou-a-kai, he was persuaded to stay the night, and whilst he was asleep, he was bound fast by a spur thrown out from the ranges towards the south-east, from which the Wai-weraiti stream (the ancient name of Stoney River) flows. Awakening in the morning he found himself a prisoner, and has remained there ever since." There are various accounts of the adventures of Mount Egmont, differing in detail, but the main facts are the same. One version says that when he was stopped by Pou-a-kai, he pulled up so suddenly that the top was carried onward, and is now seen in the boulder called Toka-a-Rau-hotu near Cape Egmont.*
*The kick, or blow, given Egmont by Tongariro is still to be seen in the hollow on its south-east side under what is called Fanthom's peak. The place where Egmont formerly stood became filled with water, and now forms Lake Roto-a-Ira (Rotoaira on the maps). From this story arises the Taranaki saying:—*

*Tu ke Tongariro,*
*Motu ke Taranaki,*
*He riri ki a Pihanga,*
*Waiho i muri nei,*
*Te uri ko au—e!*

*Tongariro stands apart,*
*Separated off is Taranaki,*
*By the strife over Pihanga,*
*Leaving in after times,*
*Its descendant in me!*

*With the poetry that is so common to the Maori, he adds to this legend, that when the mists and clouds cover the summit of Mount Egmont, this indicates that he is still bewailing and crying over the loss of his lover Pihanga; and that when Tongariro (or rather Ngauru-hoe) is in eruption and emits smoke and flame, and the volcanic forces rumble down below, this is the enduring anger of the husband against his wife's lover.*
(Smith 1910:32-38).

In one version told by Minarapa Kahu and his wife of the Ngati Mahanga hapū, Taranaki tribe at Okato in 1896, and translated from te reo Māori by William H. Skinner, Pihanga is identified as a the male maunga, and Tongariro as female. As Ngāwhare–Pounamu (2014:216) explains that the cross-outs are part of Skinner's notes as he observed how during the translation, Minarapa

insisted that Pihanga was the male maunga, and Tongariro the female maunga. Ngāwhare–Pounamu (2014:216) notes that it is uncertain how the translation affected this version:

> *In former times Pukeonaki or Taranaki resided near Taupo and Tongariro but owing to Taranaki making improper overtures (puremu) to ~~Pihanga~~ Tongariro the wife of ~~Taranaki~~ Pihanga – (a cloud, arei) passed from Taranaki (tane) towards and into a cavity or hole (tara) on ~~Pihanga~~ Tongariro (wahine) – ~~Tongariro~~ Pihanaga accussed Taranaki of his misdeed and a furious conflict took place; in which ~~Tongariro~~ Pihanga struck Taranaki a great blow with his patu, which decided the conflict for Taranaki withdrew leaving ~~Tongariro~~ Pihanga victorious, the result of his blow by ~~Tongariro~~ Pihangas patu are to be seen to this day in the cleft on summit of Taranaki – the hollow (old crater) between what we call the East and West peaks.*
>
> *Taranaki being worsted in the conflict withdrew furrowing out as he went what is now the valley of the Mangonui-a-te-ao or as Minarapa states, he came by way of the Manganui-a-te-ao in the Whanganui valley and thence into the Ngaere county. He stayed a night there and his great weight formed a depression in the ground, such depression being how the Ngaere swamp out of which flows the red water and which is to be seen until the present day. Journeying on he came to the Pouakai hills (mountain ranges). The Pouakai had always lived where we see them now and were the ages before Taranaki came to these parts. Having come near Pouakai they induced him to stay the night and whilst he was asleep they bound him fast by throwing out and encircling arm towards the south East from the side of which Wai wera iti (ancient name of Stoney river) flows. Awakening in the morning he found himself a prisoner but being now far distant from his furious rival Pihanga he accepted his position quietly and has remained there ever since. In former times there stood where Taranaki now stands a great house built by the tangata whenua called Kaimiromiro, the square of the marae was called Tara wai Nuku, and it was built (or owned) by five chiefs called Karutewhenua, Kaungohe, Kaupapa, Tirahaere, Taihuranga, and Tahairangi. When Taranaki stopped for the night the last night of his wanderings, he buried or swallowed up this great house Kaimiromiro with the marae of the five chiefs, some of these people escaped. The only living descendant of the people now living (1896) is Te Koro, a woman living a Puniho.*
>
> *Taranaki in his journey from Taupo was preceded by a stone (female) of great mana called Tok-a-rauhoto. This stone acted as a pilot or guide keeping well in advance of Taranaki. The day preceding the capturing of Taranaki by Pouakai Toka-a-rauhoto had reached within a short distance of the seacoast on the south side of Wai wera iti (Soney river). On awakening in the morning she turned to see if Taranaki was preparing to follow and then she saw that Pouakai had thrown out a new arm (spur) in the night encircling and making a prisoner of Taranaki. There she (Toka-a-rauhoto) has remained until the present time, a thing of great veneration to all the tribes, still looking upon her old friend and follower with longing eyes. But her great mana which she once possessed had since the coming of Pākehā passed away, and men who now touch her do not die as in former times.* (Skinner n.d. 1-4; as cited in Ngāwhare–Pounamu 2014:216-218)

In his work, Ngāwhare–Pounamu (2014) unravels the mysteries associated with the *Travelling Mountain Narrative* and Taranaki as an ancestor, reporting the various versions of its story. As a member of the hapu Ngati Mahanga of Taranaki Tuturu, Ngāwhare–Pounamu describes the deep connection people have with the mountain:

> A common action among the hapū and iwi of Taranaki is that when first sight the manga, we greet it "Tenā koro! Greetings grandfather!" This anthropomorphic personification of maunga and tupuna resonated with me as an Uki of Taranaki iwi (2014:20).

Manuka Henare has stressed in his writings how myths and legends "are deliberate constructs employed by the ancient seers and sages to encapsulate and condense into easily assimilated forms their views of the world, of ultimate reality, and of the relationships between the creator, the universe, and humanity. Worldviews are the heart of Māori culture" (Henare 2001: 201-202). The *Travelling Mountain Narrative* was retold and repeated through generations "as the origin of the mountain on the west coast" (Ngāwhare–Pounamu 2014:204). Taranaki maunga is seen as a living being with an "identity, a personality, and is considered an ancestor" (Ngāwhare–Pounamu 2014: 101).

In January 1770, Captain James Cook renamed the mountain, as described in his journal after first seeing the volcano standing majestically before his eyes:

> Saturday 13th Winds Variable, PM Clowdy weather. At 7 oClock sounded and had 42 fathom water, being distant from the shore between 2 and 3 Leagues, and the peaked mountain as near as I could judge bore East. After it was dark saw a fire upon the shore a sure sign that the Country is inhabited. In the night had some Thunder Lightning, and rain. At 5 AM saw for a few Minutes the Top of the peaked Mountain above the Clowds, bearing NE; It is of a prodigious height and its top is cover'd with everlasting snow. It lies in the Latitude of 39° 16' S and in the Longitude of 185° 15' W I have named it Mount Egmont in honour of the Earl of Egmont — (Wilson 2005:1)

Through the years, members of the eight iwi have fought for generations to claim back Taranaki as their ancestor and to restore mountain's Māori name. In 1986, the New Zealand Geographic Board approved the change and a year later, it was officially assigned bilingual names to the mountain, known as Mt. Taranaki/Egmont (Taranaki Mounga Project 2016).

The Waitangi Tribunal in its report (WAI 143) stressed the cultural value and importance given to Taranaki mounga:

> Taranaki mountain has extraordinary significance for all Taranaki hapu, and pressure for its return had been maintained since it was taken, unlawfully, last century. By the Mount

> Egmont Vesting Act 1978, the mountain was returned to the people of Taranaki by vesting it in the Taranaki Maori Trust Board; and then, by the same Act, it was immediately passed back to the Government by the board as a gift to the nation. (Waitangi Tribunal 1996: 299)

In 2017, negotiations between Nga Iwi o Taranaki and the Crown re-opened with the focus of recognizing Taranaki as a whole, and "ensuring that the mana Nga Maunga is respected and that the Maunga values are understood and respected. This integrated and inclusive approach also recognises the interconnection between Nga Maunga, Nga Iwi o Taranaki and the community" (Ngā iwi o Taranaki and the Crown. 2017:7). Nga iwi o Taranaki's lead negotiator Jamie Tuuta stated how the mountain has been at the centre of Treaty of Waitangi breaches endured by Taranaki Māori at the hands of the Crown:

> The treaty settlement claims of the eight iwi of Taranaki are the most severe in the country, reflecting wholesale confiscation of our lands. And, at the heart of our grievances is our tupuna maunga Taranaki. (Haunui-Thompson 2017)

A united approach would guarantee a protection toward the mountain. "'Our old people said Taranaki is the pou which binds us all, unites the eight iwi, unites the three waka and all people of Taranaki', said Jamie Tuuta. 'We're doing this for out Tūpuna Maunga to ensure that they are acknowledged and that they are cared for moving forward into the future.'" (Hurihanganui 2017:1)[13].

On December 20th, 2017, NZ Herald reported "[t]he Crown and eight Taranaki iwi signed a record of understanding over Egmont National Park (Taranaki Mounga), which will see it become the joint responsibility of local Māori and the Government" (Cheng 2017:1), granting Taranaki 'legal personality,' "meaning the land will own itself - a special legal status that has previously been granted to Te Urewera and the Whanganui River" (Cheng 2017:1). As reported by Hurihanganui, Jamie Tuuta said "Moving forward, the minister has quite an ambitious target of achieving a Collective Redress Deed by September [2018] so it requires us to work through the detail for us as iwi in terms of our aspirations framework but also what that means for the Crown." (Hurihanganui 2017:1).

In December 2019, the first step toward cultural redress was reached through an agreement between Ngā Iwi o Taranaki and the Crown to change the name and call the mountain

[13] While an apology and cultural redress have formed part of the negotiations, the final settlement will not include any financial or commercial compensation (Hurihanganui 2017).

only by its Māori name. In January 2020, the name change became official. The national park changed its name to Te Papakura o Taranaki. As historian Dr. Danny Keenan, a member of the Te Atiawa iwi said, the change restores their tūpuna (ancestor) Rua Taranaki as the sole guardian of the mountain.

> In the testimony of our old people before the land courts, during the confiscations, what comes through is that, in the context of hurt, dispossession and loss, the old people constantly asserted their mana as grounded in the land – boundaries, rivers, forests and other features were named in amazing detail. But they always began and ended with the mountain, Taranaki, which was the centre of everything. (Kennan, as quoted in Persico 2019:1).

As of 2020, the final stages of the settlement have begun, and the Crown and Ngā Iwi o Taranaki (the eight iwi of the region) is in "active negotiations" (Coster 2020:1). The settlement will "reinvigorate the cultural understanding of Taranaki Maunga" (Coster 2020:1). As Tama Blackburn asserted, ranger for the Department of Conservation, member of the Ngāti Maniapoto and owner of a tourism business along with his wife Gina, affiliated with Te Atiawa and Ngāti Mutunga, Taranaki Maunga is the one constant in a world which is forever changing.

> He's the beacon to everyone and has been for generations, even before colonisation. He's a symbol of the past, present and future and a unifier of all iwi in Te Tai Hauāuru. (Coster 2020).

*Research localities.* Taranaki comprises three main districts, New Plymouth, Stratford, and South Taranaki, with an overall population close to 118,000 people. New Plymouth is the largest city in the region with a population of 80,679. This vibrant urban center offers numerous tourist attractions from galleries and museums to the coastal walkway and easy accessibility to Mt Taranaki.

New Plymouth became one of the main stops and locations for my research. There, Bell Block, a sub-district of the city, is where most petrochemical companies have their headquarters, such as Greymouth Petroleum, along with oilfield providers such as Halliburton and Schlumberger. A few kilometres from the Bell Block is Port Taranaki, another focal structure for the oil and gas industry. It represents the departure point, from which oil, after being transported either by pipelines or road-based tanker, is then exported to refineries in Australia and Singapore. It also serves as a storage center for companies such as Methanex, a Canadian

company and the world's largest producer and supplier of methanol, produced exclusively from natural gas.

During my two fieldwork phases, Stratford became my main home base. Every time I travelled from interviews or to participate to events, I returned to Stratford. My interviewees Sarah and David arranged for me a space I could rent, not too far from their house, guaranteeing in this way the opportunity to visit them and discuss steps of my research, schedule interviews and receive updates on local news and events, as well as to have easier accessibility to transportation to other towns and the main city. As I will discuss later, Sarah became my principal liaison, connecting me to members of the community who had been involved in legal proceedings and/or disputes with the oil and gas companies. Sarah has been engaged in the community in many ways, as would later be documented through our formal interview. Having earned a master's degree in anthropology, Sarah's background along with her deep knowledge and understanding of the regulations around local fracking activity facilitated an exchange of ideas and information between us that that was exceptionally helpful to my further understanding of local conditions.[14]

During my second phase of fieldwork, the town of Stratford where Sarah and David lived became a suitable location for gathering reflections on the research process. Located 48 kilometers south-east of New Plymouth, this small rural town, with a population of approximately 5700 people, lies next to the Patea river, known for being the only navigable river in South Taranaki, and as one of the primary portals for Māori and for European settlers.

In 1978, Petrocorp developed the first successful well site on Standish Road, Stratford. Immediately, other wells followed in the area between Stratford and the village of Midhirst, Pukengahu, Ngaere and Te Popo. In 1988 the discovery of the Waihapa oil and gas field led to what is known as the TAWN field, comprising of several productive wells at Tariki, Ahuroa, Waihapa, and Ngaere. This led to the construction of the Waihapa Production Station in Pukengahu in 1993. Since then, as reported on the Stratford District Council's report, the area "has provided labour and resources for ongoing energy exploration and production" as well as for several associated downstream industries (Stratford District Council 2016:5).

[14] I will discuss the case and the decision, *Taranaki Energy Watch Incorporated v. South Taranaki District Council.* 2018. Decision No. [2018] NZEnvC 227. 23 November 2018, in Chapter Seven: Activism Through the Mountains and the Rivers: Community Responses to Oil and Gas Development.

As I will later discuss in Chapter Four (*Fractures in a fractured land: How extraction has contributed to changing the human-environment relationship),* the closeness of the production stations, oil rigs, and infrastructures have changed how people connect to their environment and the variety of ways in which they have experienced positive and negative changes in it.

*Oil and gas well sites.* In New Zealand more than 31 exploration areas are active, 22 of which are offshore. The main hydrocarbon production occurs onshore, and the map below shows the exploration, production and disposal sites of oil and gas. The available permits cover an area of 100,000 km sq, almost the size of the entire North Island. Taranaki is the only area where oil and gas have been found in sufficient quantities to be drilled for. Here, there are 27 existing producing fields, some of which have been granted permits that could last to 2050, while if new discoveries are made, the new permits could last up to 40 years (Beehive 2018).

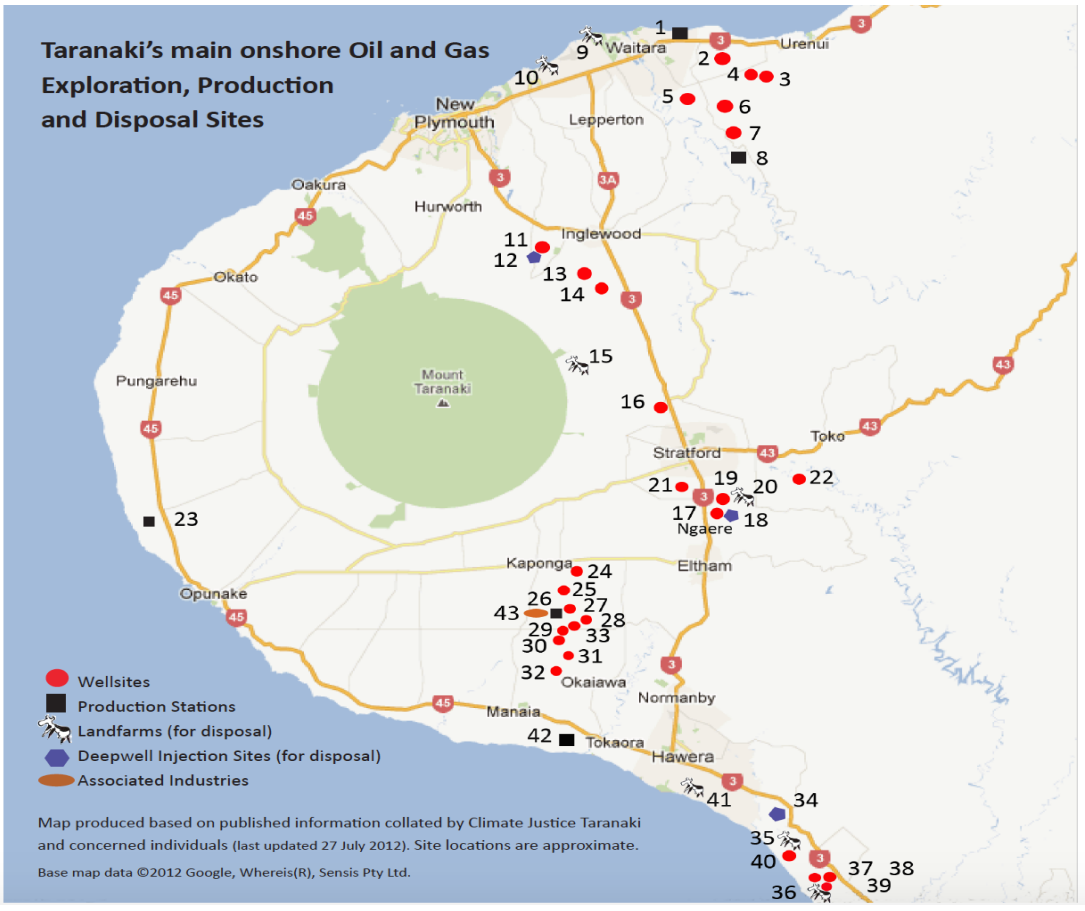



*Figure 4: Map of oil and gas sties.* Adapted from: Climate Justice Taranaki (2018)

In the following section, I will outline some of the well sites and petrochemical facilities that are located throughout Taranaki, both in the northern and southern parts of the region, to highlight the intensity of operations by numerous major corporations, operating in close proximity to homes and schools. I have had the chance through fracking tours organized by different environmental activist groups and companies to visit the sites mentioned and get a sense of the surrounding landscape. When describing each facility, I will also include the surrounding landscape and area to give a better sense of the region. I will present later in Chapter Five how the regulations and resource consents function in the region in terms of closeness to well sites, delineating some of the controversial aspects and limitations as well as some of the strengths of these policies.

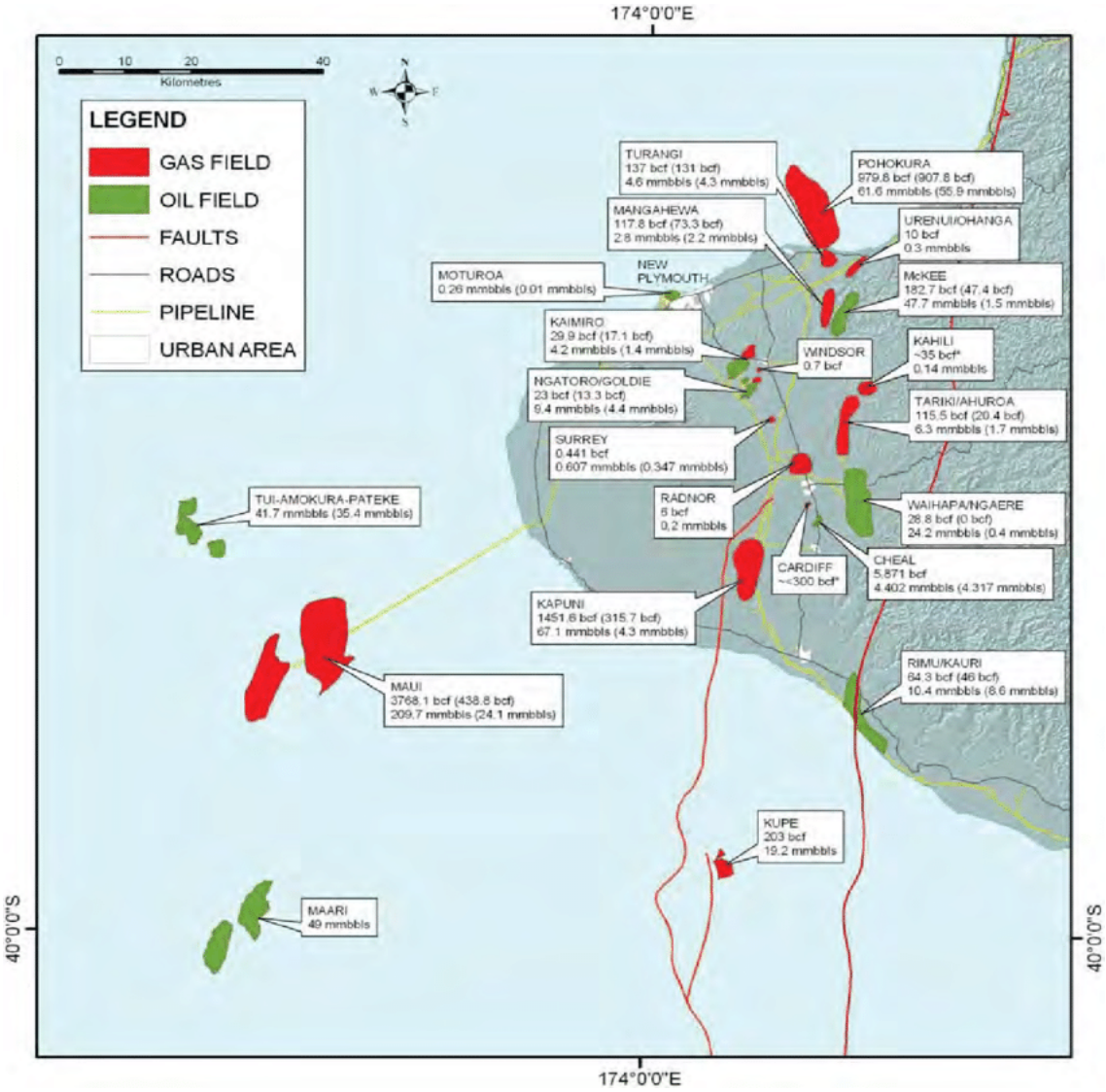



*Figure 5: Map of oil and gas fields.* Adapted from King et al. (2009)

## Copper Moki

The Copper Moki is a well site located south-east of Stratford. The surrounding land use is predominantly agricultural, although there are a number of wellsites and pipelines associated with fossil fuel exploration, production, and processing located within a 10 km radius of the site. Closer to the site an "unnamed tributary of the Ngaere Stream is located immediately to the east of the site and flows for approximately 1 km before entering the Ngaere Stream" (TRC 2013c: 4). This wellsite was built in 2011, and four wells have been drilled since then. A pipeline ties in from the site to Waihapa Production station and it was completed in mid-2012.


*Figure 6: Copper Moki wells near Stratford, Taranaki*

**Greymouth-Kowhai B/C, Ngatoro A/B, and Kaimiro Production station**

Greymouth is a New Zealand energy company established in 2000. It owns and operates several well sites and oil/gas fields. Among them we find Kowhai-B well site, Kowhai C, Ngatoro A/B, and Kaimiro Production station.

As Taranaki Regional Council (TRC) reports, the Kowhai-B wellsite has been in operation since 2012 and it is located in a rural area with low population density. This area is an active exploration region, with several production stations within a 10 km radius of the site. These operations function alongside pastoral farming and dairy runoff operations in the area. The Kowhai-C wellsite is located in Tikorangi, a small settlement in Taranaki, within the Waiau catchment. Farming and foresting activities co-exist with the petroleum production operations. In both sites, hydraulic fracturing activities take place, often alternating techniques, from gel fracturing to slick water fracturing and nitrogen gas assisted fracturing (TRC 2015).

The Kaimiro Production Station was established in the late 1980s. Its function is to separate and treat oil and gas coming from wells in Kaimiro and Ngatoro fields. The oil is then

piped to the Omata tank and the gas into national grid.  The production station separates and treats oil and gas from wells in the Kaimiro and Ngatoro fields.

Ngatoro-A is a site consisting of five wells (Ngatoro-1, -6, -7, -8, and -14). In the resource consent report, TRC states how he Ngatoro-B site was established in 1991 and consists of four wells (Ngatoro-2, -5, -9 and -11), storage facilities for recovered oil and a bunded earth flare pit. Produced gas and liquids are piped to the Kaimiro Production Station for processing (TRC 2015).


*Figure 7: Greymouth Petroleum-Kamiro "A", Drilling rig operating*


*Figure 8: Greymouth Petroleum "Ngatoro B" entry.*

**Todd Energy Mangahewa C wellsite, McKee Production Station, and Kapuni Production Station**

East from Tikorangi, and within the Waiau catchment, Todd Energy manages several wellsites and production stations. Todd Energy is a 100 % New Zealand based and owned company and a provider of natural gas. Started as a joint venture with Shell Petroleum Mining Company Ltd and BP Oil Exploration company, in 1959 Todd Energy discoverd the Kapuni field. The Kapuni Production Station is located approximately in the middle of the gas field, adjacent to the Vector Gas Ltd facility called the Kapuni Gas Treatment Plant (KGTP). Since 2017, Todd Energy has become the sole owner of the fields. Kapuni Production Station's main function is to "gather the gas and condensate from the wellsites" (TRC 2018a:1). The gas is later delivered to the treatment plant for processing and exported to the Paritutu Tank Farm, from where it is then transported via road and rail tankers. The landscape around the area is mainly rural, with farming and forestry activities co-existing, as the TRC reports, with active petroleum exploration and production operations. At the Kapuni production station, three flares operate, their constantly burning yellow flames visible at night.

*Figure 9: View of Kapuni from community member's houses*

The McKee Production station was commissioned in 1984 to receive and process oil and gas for several wellsites in the area, including Mangahewa C. The land is shared predominantly with the dairy farming industry. The product obtained during extraction from wellsites is then separated into gas, crude oil, and condensate. These are then transported via pipeline or road tanker to the Omata tank farm for storage, in New Plymouth. The produced water, and any other byproducts from the fracking activities are then deep-well injected. The uncontaminated stormwater from both McKee and Mangahewa sites goes through a skimming process in a pit at the McKee site and is then discharged in the Mangahewa stream. Raw product from the wellsites is separated into gas, crude oil and condensate. These products are transported via either pipeline or road tanker to the Omata tank farm in New Plymouth. All uncontaminated stormwater from the McKee and Mangahewa sites passes through a skimmer pit at the McKee site and discharges to the Mangahewa Stream. Treated impounded stormwater is discharged to the Waitara River (TRC 2021:3).

**TAGOil Cheal B/C/E and TAGOil Sidewinder**

TAGOil is a Canadian-based oil and gas exploration company which until recently owned and operated different wellsites in the Taranaki region. In September 2019, TAGOil officially closed its transaction with Tamarind Resource Pte. Ltd, to which whom it sold all the Cheal wellsites. These are all located in the proximity of Stratford and Ngaere, a village south of Stratford. Both Cheal B, Cheal C, and Cheal E wellsites were all established for previous exploration efforts and have accommodated new exploration, as well. The construction of each wellsite involved removing topsoil to create a firm foundation on which to erect the drilling rig, visible at the entrance of Stratford. The surrounding landscape is rural, sharing land with farms and residential houses (TRC 2016). The nearest residences are approximately 260, 600, and 750 m away from the wellsite. According to the company reports, bund walls, artificial banks of soil, and location help minimize effects on the neighbors.

*Figure 10: Production station sharing land with a dairy farm*

The Sidewinder wellsite is located approximately 7 kilometers from the village of Inglewood, and it was constructed in 2011. The same procedure for establishing the wellsite was followed as for the previously-mentioned sites, and similarly, bund walls and soil banks were installed to limit negative impacts on neighboring residences. For this location, the nearest

residence is approximately 250 m from the area (TRC 2016). The absence of a discussion of specific impacts including noise, smells, air quality, heavier use of roads, etc., as well as the ever-present risk of explosion or factory problems does not mean those impacts do not exist.


*Figure 11: TagOil Sidewinder Production Station*

**Origin Kupe Production station**

Origin Energy is an Australian company operating oil and gas projects and holding several petroleum explorations interests in New Zealand. Its Kupe Production Station, along with offshore pipelines and an offshore platform construction commenced in 2006. From the Kupe field, located offshore approximately 30 km south of Ohawe Beach in South Taranaki, Origin Energy extracts natural gas and light oil. The fossil fuel retrieved is then transported to shore and processed at an onshore production station facility, as shown in the image below (Figure 12). The onshore production station occupies roughly 20 hectares of land and includes truck loading facilities as well as a storage facility for LPG and condensate gas (TRC 2018b).

**Maui production station**

The onshore Maui Production station and the pipelines are operated by various companies including Shell, OMV (an Austrian-based company), and Todd Energy. The onshore Maui Production Station at Ōpunake was built to process gas and condensate from the offshore Maui Field. The Maui field was discovered during the 1960s and its exploration began in 1969, with production starting 10 years after from the Maui-A platform. The gas and condensate produced is transported from the offshore Maui platform to the production station via submarine pipelines. In 1992, another platform, Maui-B, was constructed. The product obtained from it is piped to Maui-A for initial separation and then sent to the production station. At the production station, the hydrocarbon components are separated and then transported off-site by road tankers, while condensate gas is stored in tanks at the location.

The Maui Production Station separates the various hydrocarbon components, mainly by distillation. Flaring continuously occurs, burning fuel gas as "a purge to prevent air ingress to the system … avoiding an explosion risk" (Taranaki 2020b:4).

*Figure 12: Maui Production Station- Adapted from Taranaki (2020b)*

*Additional facilities.* **Ammonia-Urea plant (Kapuni)**

Ballance Agri-Nutrients is a New Zealand-owned-and-operated company whose core business is to manufacture fertilizers. In 1992, they purchased the country's only ammonia-urea plant, which was commissioned and constructed originally in the 1980s. The plant uses gas from Taranaki fields, and this is supplied for both fuel and process purposes. Urea is the mostly widely used nitrogen fertilizer in New Zealand.

**Colin Boyd- Landfarming**

As TRC reports, Colin Boyd operates along with MI SWACO two drilling waste stockpiling facilities and a landfarming operation on its property, near Inglewood, within the Waitara catchment, Taranaki. Landfarming, as described by Bloomfield and Doolin is "a disposal process that involves spreading oil and gas waste on to land and mixing it with topsoil to allow bioremediation of the hydrocarbons" (2017: 2457) [see also Dodge and Metze 2017; Metze 2017].

Near the same facilities, MI SWACO Company operates the Surrey Road stockpiling infrastructure on behalf of the consent holder (Colyn Boyd). The stockpiling facilities are located in two locations — one on Surrey Road and the other in close proximity to Derby Road North, near Inglewood.

**Methanex Motonui and Waitara Facilities**

Methanex[15] is a Canadian company and New Zealand's only methanol manufacturer, producing up to 2.4 million tonnes per year and operating three plants in Taranaki: two at Motonui and one in the Waitara Valley near New Plymouth. Methanol is an ingredient produced from natural gas and is an ingredient used for hundreds of everyday industrial and consumer items. Its derivative products, acetic acid and formaldehyde created via chemical reactions, are

[15]In February 2021, Methanex announced plans to mothball one of its Taranaki plants with permanent job losses expected (Radio New Zealand 2021). Methanex NZ managing director Dean Richardson cited the inability to secure gas supply as the main reason for the partial shutdown. Methanex Waitara Valley facility will be kept in a safe condition in case a restart of the plant could occur, and they are able to retain activities such as truck loading. Two production trains at Motunui would continue as well.

used as “base materials in acrylic plastic; synthetic fabrics and fibers used to make clothing; adhesives, paint, and plywood used in construction; and as a chemical agent in pharmaceuticals and agrichemicals” (MGC n.d.). Methanex describes methanol also as a clean-burning, biodegradable fuel, with many environmental and economic advantages that are making it an attractive alternative fuel for powering vehicles and ships, cooking food and heating homes (TRC 2020a).

*Figure 13: Methanex company (methanol producer).* Methanol can be used in fracking fluids

The Motunui facility was constructed in 1983 and as reported in Taranaki Regional Council (TRC), the decision to build the facility was made under the National Development Act 1979. The local hapu led a major community campaign to fight against its establishment in the late 1980s. The facility “was originally operated by the New Zealand Synthetic Fuels Corporation (NZSFC) to produce petrol from natural gas, during the ‘Think Big’ era.”[16] NZSFC operated two production units, Methanol 1 and Methanol 2 as well as a gasoline to methanol plant. From 1995 to 2004 the Motunui site ran full production, but around the end of this period, changes in global

[16]As reported in Te Ara, The Encyclopedia of New Zealand, Think Big was “a government programme of energy related projects designed to reduce New Zealand’s dependence on imported oil, and to broaden the basis of exports” (Pawson 2010:1). This programme focussed on using Taranaki oil and gas reserves for industrial development as well as building the Clyde Dam in Central Otago for power generation purposes (Pawson 2010).

demand led to production of high-grade methanol and therefore it became more profitable for Methanex to fully convert the facilities to produce only methanol. Consequently "the synthetic petrol part of the facility was de-commissioned and dismantled in October 2008 following a four-year period during which the facility had remained idle" (TRC 2020a: 4). Currently, the Motunui site operates at full capacity. Whereas for the Waitara Valley site, as TRC reports:

> [this] was established by Petralgas Chemicals NZ Ltd (a 50:50 New Zealand government and Alberta Gas partnership) in 1983 as a self-contained facility to convert gas from the offshore Maui field into high grade methanol. Subsequently the facility changed ownership to Petrocorp and Fletcher Challenge Methanol until 1994 when Methanex Motunui Ltd gained ownership of the site. (TRC 2020: 4)

Next to Motonui there is Pohokura Production Station, once belonging to Shell and now to Tamarind, which processes gas form the Pohokura gas field in nearshore waters (TRC 2020).


*Figure 14: Pohokura Gas Fields*

Image retrieved from: https://www.offshore-technology.com/projects/pohokurafieldnewzealand

# CHAPTER THREE: FIELDWORK AND METHODOLOGY

As I mentioned in the previous chapter, the landscape and surrounding environment regularly shifted into an active participant throughout my fieldwork. The accessibility of specific locations, the layout of a certain place, and the features embedded in the landscape itself often meant I had little control of my fieldwork schedule. The urban/rural contrast, the presence of industrial infrastructures, which I briefly described in the sections above, as well as geographical landmarks, created changes in how I experienced the land around me. I structured the interviews influenced by the surrounding environment, which made me often ponder and reconsider some elements of my project and reflect on its strength and limitations[17]. I had to frequently re-arrange interviews to find suitable spots reachable for both me and my interviewees, and to locate areas where I would be able to start a preliminary analysis of data and archival information relevant to my topic. I eventually created a list of routine places, as I would define them, to have a better structure in my fieldwork process and progress. These were places that I would often go back to write down notes on what I had observed and places that helped me to face the constant shifts mentioned.

In the following paragraphs I will outline my methodologies, the questions and the structure of my interviews, how these changed and the steps I followed in recruiting my participants. I will also reflect on the methods that I initially considered to use but eventually had to abandon. I will discuss events I participated in and the strength and limitations of participant observation in my project. I will conclude by presenting how I analyzed my interviews and discuss the steps I followed during this process.

## Interviewing and Recruiting Process

Recruiting participants proved to be a difficult process throughout my research. Recruiting often was a combination of word of mouth and fortuitous connections. I began to contact participants before my preliminary fieldwork phase. I first established contact with one of my interviewees through a connection made during a talk organized by the Aboriginal Speaker Series at the University of Alberta in March 2017. I immediately initiated a communication, which at first was slow, but later intensified as my departure date for fieldwork got closer. As I

[17] I will discuss some of the changes and limitations (i.e., the decision not to use focus groups) later on in this section.

wanted to listen to different perspectives and views toward fracking, I reached out to members of environmental non-profit organizations such as Greenpeace NZ, and companies in the petrochemical sector operating in Taranaki. In both cases, these connections resulted in being initially unsuccessful. I persevered and eventually established a communication with environmental organizations through the help of the Environment and Conservation Organization of Aotearoa New Zealand (ECO), which forwarded my contact information to Climate Justice Taranaki (CJT). As reported on their website, CJT is "a community group committed to justice, action, and true solutions on climate change" (CJT n.d), supporting and organizing various events and initiatives concerning the environment and its protection. Through the contact with CJT, I then continued a dialogue with my interviewee Sarah and got more information on potential community members interested in participating in my project. It was more complicated to reach out through phone or e-mail to the fossil fuel industry in New Zealand from Canada, and I hoped that things would change once in the field. In my later experiences, I found that reaching out to companies and initiate a dialogue was still complicated, perhaps even more so in person. I often had to show up unannounced, just to secure the mere possibility of a meeting with any representatives, and few followed up in their promises to get back in touch or set up a meeting with me.

As my fieldwork started, I continued to actively recruit participants using alternative means such as flyers and posters, which I hung on community boards in Stratford and at public places in New Plymouth, including Puke Ariki, the main library and museum. Word of mouth turned out to be often the most successful method. The collaboration with my key interviewees and other members of the communities led me to be connected to other participants, and to open a dialogue with more individuals with different opinions and backgrounds. Toward the start of my second phase of fieldwork, Sarah, one interviewee, suggested and put me in contact with a local journalist in Stratford, believing that this would be of help in finding more people interested in being interviewed and being part of my project. After the first newspaper article, a reporter from the *Taranaki Daily News*[18] contacted me to write a short story on my project and to learn more about my background. This expanded, even more, the radius of my research, to the point that the article appeared in the *New Zealand Herald* as well, and the research was mentioned on

[18] "Canadian student researching oil extraction views in Taranaki," December 11th 2018. Article by: Ilona Hanne, Stratford Press.

Radio New Zealand during a segment from *The Panel*[19]. I started to be contacted by local mayors, government representatives, and policy analysts working at the Ministry of Business, Innovation & Employment.

My fieldwork as previously mentioned consisted of a preliminary phase from mid-November to mid-December 2017, in which I started to gather valuable information about the region and contacts of potential participants. as well as an initial set of interviews[20]. I returned Taranaki exactly a year later, in November 2018 and completed my second fieldwork phase at the end of March 2019. The timing and scheduling was planned according to my funding availability. During my six months of fieldwork, building rapport and the trust necessary to feel part of the communities I visited was often complicated. Gaining trust among the community members and professionals was often an arduous task as expectations from both groups were varied, and a neutral stance was often hard to maintain. People would question my role as an anthropologist and whether I had been funded by the industry or had an activist agenda to go against the petrochemical companies. Nonetheless, as Russel H. Bernard (2006) asserts, "rapport is what makes it possible for anthropologists to do all kinds of otherwise unthinkably intrusive things." (2006: IX) As Laura Nader points out, rapport includes establishing lines of communication between the anthropologist and his interviewees, allowing the ethnographer to collect data (1986:113).

When planning an interview, I set up a place with my participant, often at a public spot, such as the library or a local coffee shop or a bakery or, when it was convenient for them, in their homes. Lacking a valid driver's licence, I was limited in my possibilities to travel as easily as I would have preferred. Whenever possible, I walked to my destinations, as a way to help me experience and observe more of the landscape. There were days when I walked for at least four hours along the seashore to reach my interviewees or to try to book interviews. I also relied on public transportation (in the form of city and regional buses) and, on several occasions, thanks to the kindness of my participants, I was given a ride to the place chosen for an interview or to a specific event. When travelling, an important downside I had to consider was the bus scheduling: the latest bus available would be at 6 pm.

[19] The Panel is a radio program that often features a range of panelists from across the opinion spectrum, together with expert phone-in guests.
[20] Prior to my preliminar fieldwork phase, I had received ethics approval from the Research Ethics Office (REO) at the University of Alberta on November 6th, 2017.


*Figure 15 Missing a bus connection to Hawera, stranded in Egmont Village.*

This often meant that in cases where I missed a bus or connection, I would find myself stranded in small villages, near gas stations or in more rural areas just outside the main town of Stratford or the main city of New Plymouth. As this was a sparsely populated area, no taxi or similar service was available for me to rely on.[21]

[21] In my preliminary fieldwork phase I considered the limitations of not having a car in Taranaki, and that is why I used as my recruitment methods of posters and flyers in places I could reach or was familiar with, along with relying on referrals by word of mouth.

If the interview had been scheduled in a small cafe, it became a familiar practice for me to find myself, while taking notes after an interview, sharing the table with "peculiar" companions (see figure 16).

*Figure 16: Picture taken at a café in New Plymouth*

At times, when I had been introduced through my key interviewees, the interview would be scheduled through them and it often happened that I would meet the interviewees at their homes. By applying a snowball technique (generally referred also as a *chain referral method),* I created a small network. As W. Paul Vogt (1999) asserts, through a snowball technique, "one subject gives the researcher the name of another subject, who in turn provides the name of a third and so on" (368). As Marinus Spreen (1992) points out, snowball sampling is often placed within a wider set of link-tracing methodologies, making it possible to take advantage of the different social networks of participants to provide a researcher with an ever-expanding set of potential contacts (Thompson 1997). Before starting an interview, I would explain the procedures, risks, and rights to withdraw at any time, and how I would keep and use the information recorded through my audio device. Informed consent was obtained both verbally and/or in written form. Combining both unstructured and semi structured interviews with a variety of community members often brought me to re-adapt my questions and to recalibrate the level of formality. Unstructured interviews allowed participants to express themselves on their own terms, and at

their own pace (Bernard 2006). Stephen Devereux and John Hoddinott (1993) point out how unstructured interviews can be a useful method in the early stages of fieldwork. I took this into consideration, especially during my preliminary fieldwork phase as I began to establish relations with my interviewees. Using this format of interviewing can allow you to "reveal important background information and the concerns of local people; and certain types of questioning–life histories, local history, group discussions…" (1993:30). Nonetheless, some drawbacks exist. Through unstructured interviews the possibility to produce statistical aggregates is limited and often the responses given by the respondents are difficult to compare. Even when more detailed and specific quantitative information is asked, "important details might be missed because the fieldworker does not have the memory prompt of a coded questionnaire form on her or his lap" (Devereux and Hoddinott 1993:30).

For the semi-structured interviews, I had formulated a set of questions that I applied as a general framework to make sure that I would be able to grasp more information useful to answer my main research questions, without trying to exercise excessive control (Bernard 2006). This guideline was also based on whether the person being interviewed identified himself/herself as mainly a professional in the sector or a community member affected by the extractive process. I formulated approximately 15 questions, revolving around four main topics of discussion: hydraulic fracturing operations in the region and negative or positive impacts observed, the knowledge and information received by companies or other sources, the changes (if any) in the interviewee's sense of belonging and connection to the surrounding landscape, and the current socio-economical events occurring in the region concerning fossil fuel extraction and the interview's opinion on the future of energy in the country. I continued to re-adapt and modify the frameworks as news and governmental decisions concerning the oil and gas industry were released, an aspect of which I will discuss later in this chapter. This way of re-adapting the questions allowed to maintain a flow in the conversation and changes were often responses to new updates from the government's decisions or statements released from companies or trade associations as the changes in policies concerning offshore and onshore exploration started to become concrete. The set of questions was beneficial in making sure the conversation between the participant and me would remain on topic. The semi-structured interview style also offered "the freewheeling quality of unstructured interviewing…" (Devereux and Hoddinott, 1993:30), which allowed for the individual to feel at ease and share his or her thoughts more easily

Ethnographic interviewing represents "a powerful tool for invading other people's way of life" (Spradley 2016: 22). It can lead to revealing information that "can be used to affirm their rights, interests, and sensitivities …" (Spradley 1980: 22), or to experience moments where the interviewee can feel uncomfortable as well as he or she expresses feelings or opinions on controversial issues. That is when, as Spradley says, it becomes essential for the interviewee to have the protection of "saying things 'off the record' which never find their way into the ethnographer's field notes'" (1980:22). Throughout my interviews, I had to take extra care in handling certain aspects of the topic and to try my best to avoid triggering the resurfacing of painful memories or uncomfortable situations for the interviewees who had been through negative experiences associated with petrochemical extraction, either directly or indirectly. I will discuss aspects of their experiences later, in Chapter Four *(Fractures in a fractured land: How extraction has contributed to changing the human-environment relationship)*[22],[23].

The language barrier and the terminology used by my interviewees, from acronyms to specialized chemical components, to Māori vocabulary I might have been unfamiliar with, made the transcription process challenging and lengthy, requiring several months and multiple phases of transcribing, and thorough re-checking of transcriptions. Of the 43 interviewees, 14 participants were women, and the remaining 29 were men. Two of the participants identified themselves as Māori[24], while the rest identifed as European/Pakeha. The average age of the pool of participants was 45-50 years old, with few participants above their 70s, and only one participant in their late 20s, or early 30s. All but one agreed to be recorded to facilitate my transcription. My goal was to recruit as many interviewees as possible from different social and economic backgrounds, to have a better grasp of the variation in perspectives, so that my

[22] Due to concern for the maintenance of anonymity of my interviewees, I have not included details or descriptors that could identify those who do not want to fully be identified, as that would violate the agreements established with the interviewees.

[23] I used initials instead of names for those who were comfortable sharing certain parts of their personal lives they discussed with me, and full names for those who were at ease with sharing their names. I used an "I" (standing for interviewee) for those who wanted to stay completely anonymous. This category is for speakers who wanted to remain anonymous but who might nonetheless be identified from what they said, so they are grouped together as "I" for 'interviewee' to provide some cover.

[24] The two members who identified as Māori respectively belong to the Ngaa Rauru iwi and to Ngāti Maniapoto iwi. I conducted my fieldwork with respect for Māori iwi and hapu members and their protocols, and carefully considered their history of struggle and injustices. I avoided imposing myself in a context that, as a European ethnographer, I might contribute to the resurfacing of memories of violence experienced in the past or still lingering in the present and worked to avoid bringing up any additional emotional pain or memories for them. Therefore, the few voices I was able to hear were gathered after either directly interacting through email with Maori iwi representatives or as the result of personal contacts and word-of-mouth opportunities.

interviewees would be fairly representative of the region overall, and the range of views concerning fracking. On a professional level, interviewees' jobs ranged from engineers to oil rig workers actively employed for local/international oil and gas companies or with a past experience in the sector, to members of trading associations and representatives in regional or local councils or elected members in government's positions, to educators and instructors, to local artists and members of environmental activists' groups, to farmers and retired members in the community.

As I processed the information and transcribed the recordings, I engaged in a preliminary analysis where questions regarding access to valid and exhaustive information on the risks and impacts associated with fracking and unconventional extraction became an aspect of inquiry. During this first step of analysis, I annotated the different information participants would discuss with me and the sources they drew from to keep oneself up to date with the petrochemical industry and its role in the region. I checked what was made accessible or not to them, the level of knowledge shared from governmental bodies and companies on the matter, and how detailed the information was available to them. As every interview was on average an hour to an hour and a half long, the number of facts and particulars discussed and answered by each interviewee was copious. This made me selective on what to consider during the next stages of analysis. I therefore selected excerpts from the 43 interviews, and during my second phase of analysis applied critical discourse analysis categories, as I looked for patterns, recurrent themes and examined these under the current political landscape. Below I have inserted a key table including the symbols I adopted as I was transcribing my interviews:

| | |
|---|---|
| /…/ | Pause of significant length |
| … | Short pause |
| (inaudible) | Unclear audio |
| // | Volume/tone rising |
| *text* | Emphasis in speech |
| (laughter) | Laughter |
| […] | Transcription omission of section |

| | |
|---|---|
| \|\| | End of interview segment |

*Table 1: Symbols adopted during transcription phase*

In the transcription phase, to facilitate the selection of excerpts, I highlighted the most compelling quotations shared by the interviewee/participant[25]. I quoted the participants exactly as heard, and where I truncated or removed portions of the narrative, I indicated this with […], either because it would breach the anonymity requested, or because it was a digression irrelevant to the topic at hand, or due to a request made by the interviewee (either during the course of the interview, or following the interview session) that a section of the interview be omitted. As for the creation of codes and themes, I initially applied a frequency model, using world clouds to see which concepts and key terms would repeat more often within the texts, and reveal in this way the most repeated and familiar words used, in order to assist in further analysis. I then used ATLAS.Ti, a qualitative analysis software program to help me in the selection and creation of codes and themes from my transcribed interviews and field notes.[26] The table below shows the codes I created and the way these were grouped under three overlapping themes: (1) Feelings toward place and environment; (2) Risks perceived and observed; and (3) Regulatory concerns and opinions:

[25] My original intent was to share the transcriptions with my participants and discuss characterizations and quotes to include through a collaborative approach. However, in 2020 due to COVID-19, I had to face limitations in this process as communication with my participants was impacted by the pandemic, and opportunities for exchanges became very much reduced. Given that Taranaki is a rural region that was not well served by broadband at the time, many of my interviewees had no direct access to email and/or their lifestyle does not depend on it, or it is not closely linked to this means of communication. The only alternative to the post, which could not be seen as a secure way to send confidential transcripts given shared mailing addresses, would have been to rely on third parties to print out transcripts and send them on for review, and this was, of course, not a sufficiently private means of communication, either.

[26] I have retained all of my original fieldnotes. Where confidentiality is a special concern, I have blacked out or removed the interviewees' names.

| CODES | THEMES |
|---|---|
| **Sense of belonging and attachment** | **Feelings toward place and environment** |
| **Uncertainty** | |
| **Anguish** | |
| **Solastalgia** | |
| **Detachment and desensitization** | |
| **Alienation** | |
| **Connection with the land or a geographical feature** | |
| **Fear of the future** | |
| **Water contamination** | **Risks and concerns observed, experienced and/or perceived** |
| **Flaring and light pollution** | |
| **Noise** | |
| **Earthquake and seisimic activity** | |
| **Well integrity and abandonment** | |
| **Consent process** | **Regulatory concerns and opinions** |
| **Oil & Gas community involvement and consultation** | |
| **Trust** | |
| **Emergency response and plan** | |
| **Lack of information** | |

*Table 2: Thematic Analysis Table*

## Participant Observation and Role of Key Interviewees

Participant observation as an experiential practice many times included simply tagging along with my key interviewees and being open to unexpected events or opportunities. Sometimes, new participants were recruited during the very process of participant observation. Davyd Greenwood (2008) however is critical of how often participant observation doesn't include actual participation per se, as ethnographers choose what to observe and how to observe it (while abiding by local norms), how to interpret what they see and how to write about it. In other words, as Shannon Speed points out, more observation than participation it becomes then more of a data-gathering strategy than one focused on "the purpose of creating relationships of mutual obligation and collaborative learning" (Speed 2008:226). I kept Greenwood's words in

mind as I came to understand the importance of building rapport and trust and a life connection with people I encountered and interviewed. Without this persistent thought and this approach, I would have not been able to connect with as many people as I did, since word was often spread only among a few circles of people. Throughout my fieldwork I took part in several events, meetings, and gatherings organized by community members, non-profit organizations, or governmental bodies. As Malinowski (1922) stressed, participant observation allows one to capture different features of a culture based on the idea of observing "the imponderabilia of actual life" (Malinowski 1922: 20) [as cited in Robben and Sluka 2012: 76], those elements that at first can seem trivial aspects, part of a routine, but which are revealed to be necessary for understanding more about the people studied.

I had various opportunities that unexpectedly offered me chances to meet people interested in getting involved in my project. On November 4th 2017, through the same contacts I had reached out to inform them of my flight cancellation, I was able to join protesters from environmental activist groups Kiwi Against Seabed Mining (KASM) and Climate Justice Taranaki (CJT) at a hikoi (march) in New Plymouth, Taranaki. There I met Urs and Emily, active members of CJT, and had extended conversations with a few representatives of Greenpeace New Zealand. The aim of the march was to raise public awareness about potential impacts that seabed mining could have on the environment. KASM has raised concerns about the effects that the constant drilling and offshore exploration would have on the fragile population of Maui dolphins. In Taranaki, the Maui dolphins, critically endangered and exclusively found on the west coast of the North Island in New Zealand, have been long commemorated as part of Māori heritage, as they are of particular significance to Ngāti Ruanui iwi (tribe) based in South Taranaki[27], and are the subject of ongoing conservation efforts. Stories and legends have portrayed dolphins as taniwha, or water spirits, who often intervene in human life and who guided the explorer Kupe from the ancient Polynesian homeland of Hawaiki to New Zealand (see Beattie1994). KASM urged the stoppage of offshore drilling activities and seismic testing the Taranaki Basin, arguing that the repetitive sound waves used to collect data critically disturb marine life and threaten the last few Maui dolphins located in the region. Seismic testing allows companies to obtain images of the rock formations below the Earth's surface. The loud and repetitive sounds caused by air

[27] Current efforts and engagements involve the creation of a South Taranaki Whale Sanctuary to help protect whales, dolphins and porpoises, to prevent seabed mining and more fossil fuel exploration, and create sustainable local jobs through ecotourism ventures. See: www.greens.org.nz/whale_sanctuary; ruanui.co.nz/fight-seabed-continues.

gun blasts can travel up to 2,500 miles and they can occur as often as every 10 seconds for days and weeks at a time. The noise can reduce catch rates for fish and can disrupt behaviors in marine mammals who rely on sonic cues for feeding, mating, and avoiding predators. Studies on the effects of seismic surveys and harm or injury to marine animals or the environment give nonetheless still conflicting results (DFO 2004).

The hikoi was also in support of a march called *Walk the Walk together for our Ocean* carried by Dr. Steward who planned a personal protest to manifest his concerns on offshore drilling and seabed mining: his aim had been to do a 400km coastal walk to raise funds, from Raglan to Whanganui, in support of KASM's High Court appeal against the EPA.[28]

At the Parihaka event, my interviewee Sarah discussed the progress made by Taranaki Energy Watch (TEW) in relation to their environmental court case against South Taranaki District Council's proposed oil and gas rules (a case that I will discuss later in Chapter Seven). Along with Sarah and Catherine, members of CJT, a few days before, I had taken part in small tours around some of the wellsites and production station facilities. Both Sarah and Catherine explained to me how in past years it was common for them to organize bus tours around the region to show fracking sites and bring awareness to local people as well as tourists visiting Taranaki. Later, in my second phase of fieldwork, I explored more of the area, as I had the opportunity to visit wellsites and other petrochemical facilities along with meeting different individuals holding opposing views and was invited for formal visits by local petrochemical companies. These opportunities allowed me to shed more light on the polarizing aspects and perspectives on resource extraction, allowing me to see comparisons and contrasts.

A point to be made relating to this is how the access to participation at events was often made easier through the relations I established with my key interviewees, who at times could be seen almost as gatekeepers. James Spradley (1979) talks of these two separate categories, introducing also what he defines as 'encultured informants,' "who are consciously reflexive about their culture, and either enjoy sharing local knowledge or are in a status position where this is expected of them" (as cited by O'Reilly 2008: 133). I observed this reflexivity especially during the stays with my key interviewees, who were more familiar and more knowledgeable about the

[28] In November 2020, the Court decided to stop Trans-Tasman Resources' plans for seabed mining off the South Taranaki Bight. Trans-Tasman Resources Ltd hopes to overturn this decision in the future. In March 2021, a bill to ban seabed mining has been proposed, with the objection of Trans-Tasman Resources Ltd. The company has argued a lack of scientific credibility if this decision gets approved (TTR 2021).

regional policies and regulations around fracking operations and would eagerly share their knowledge and insights about their community. Social gatherings, dinners, and coffee breaks at the house of my key interviewee Sarah led us to speak for hours on the experiences and matters concerning fracking and she would share her knowledge of the extractive practice with me. During these talks, I would often make notes on things that I would find unusual or different compared to the landscape lived and experienced elsewhere. As I travelled through the region, I would notice elements of the oil and gas presence in the region, from posters, signs, and drilling bits used as doorstops and pointed them out to my participants or interviewees. The contrast introduced by the lens through which we saw things would open dialogues and conversation around the presence of oil and gas in the region in new ways, as I tried to grasp their views about fracking and the fossil fuel industry, and to learn about cultural aspects of a community not as familiar to me. An example of this interaction occurred immediately after the meeting at the Taranaki Regional Council (TRC) in Stratford, which was held to discuss changes in the coastal plan before submission.

> **Fieldwork note (unedited)[29], 3/12/2018**: As we walk to the building Sarah tells me how before the court case in which she is involved, she used to work for TRC. Every summer she and her sister would apply for summer jobs open to young students. She recalls how she would go to the beach collecting water samples and that she had at the time no idea what was behind the TRC, in respect to their relationship with oil and gas companies. Before stepping into the building, Sarah points out the doorstops to me. I tell her that I was noticing them too and that I was intrigued to know what they were. She explains that those are wellheads that oil and gas companies often donate as a token of appreciation. She explains how she never noticed those before at the entrance of the building. I agree with her about the unusual placement. She expresses to me how the presence of the two wellheads gives her the idea of the council welcoming with open arms the industry, and this makes her even more wary of the relationship between the administrative body and the companies. After the meeting she reiterates this point and observes how since me being there in the field, she started to notice tiny things like these even more.

[29] As I often took my fieldnotes quickly in between interviews or while attending events/meetings, and with English being my second language, I jotted these down without being too careful about my grammar and/or syntax. Therefore, I edited all my fieldnotes for grammar. When categorizing my fieldnotes as edited and unedited this distinction refers to obscuring information/identity that could cause anonymity issues. An example of an edited fieldnote can be found on page 107.

## Reflection on Methods

At the preliminary stage of my fieldwork, I had originally developed an interest in gathering more views and generating a wider discussion involving groups of participants. I had planned to use another method of data collection, *focus groups*. Its use, like guided interviews, I thought could help me as "a source of follow-up data to assist the primary method" (Morgan 1997: 3) of investigation. As David L. Morgan (1997:2) asserts, one of the key characteristics of focus groups is "the explicit use of the group interaction to produce data and insights that would be less accessible without the interaction found in a group."

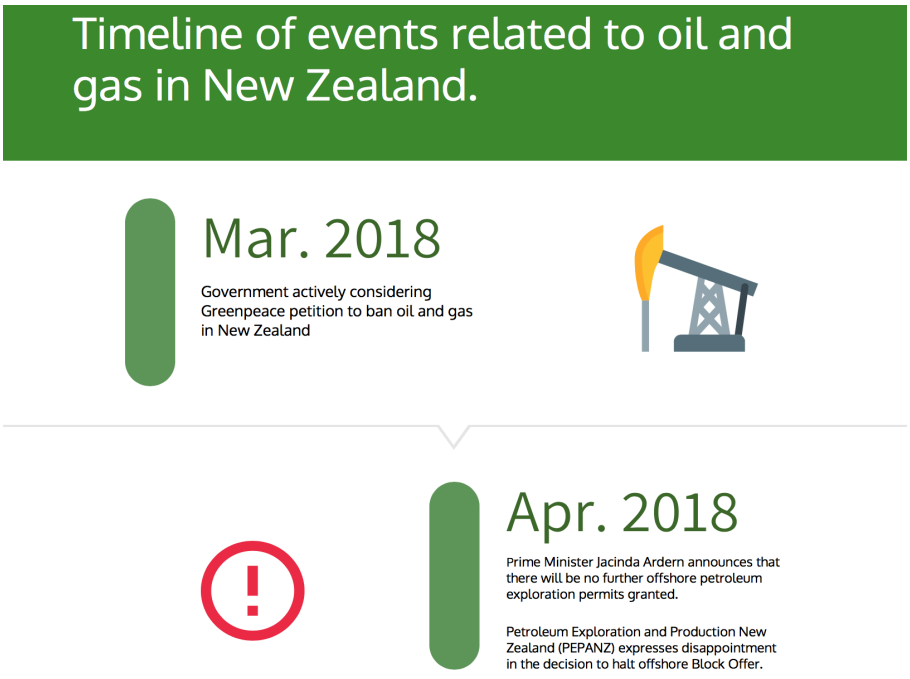
For such focus groups I recognized the complications in recruiting participants during my second phase of fieldwork and how difficult it would have been to handle group dynamics. I was aware that interviewees may have different agendas and try to make their point of view known through different ways of expressing it. I evaluated and weighed all the pros and cons of using this method and as soon as I had a clearer map of the surroundings, the difficulties and risks involved for my participants became clearer to me. Issues of confidentiality would have quickly risen as it became evident to me how the degrees of separation in small rural areas were often shorter compared to more populous regions.[30] I had planned for groups of four to five individuals, thinking that, with this design, participants would feel welcome to express their opinions on a polarizing topic such as hydraulic fracturing. This topic has led to social friction among members of the same community, and within families and circles of friends, as became clear in my preliminary set of interviews. The more intimate one-on one or family interviews would seem to create a better opportunity for participants to be more open about personal issues. One critical limitation that I was aware of, it was that within a small group, with the intimacy of the setting created, there should be a tendency of participants to be more open about personal issues. If, on the one hand, such intimacy could allow one to gather data that would be less likely to be shared in a more structured one-to-one interviews, on the other hand, the interaction within a group could lead to a conformity and homogenization in the expression of ideas in opposition ot those who do not conform. While such interviews could still be useful to the analysis (Wittenbaum and Stasser 1996) it is important to understand that "[i]n general, though, focus groups–like participant observation, in-depth interviews, and other systematic qualitative

[30] It was not uncommon to discover that several of my interviewees shared either a second or a third-degree cousin or knew each other because they had attended the same primary or secondary school.

methods– should be used for the collection of data about content and process, they should not be relied on for collecting data about personal attributes or for estimating population parameters of personal attributes" (Bernard 2006:232).

Although I had planned to organize groups composed in such a way as to find a good balance between homogeneity and internal heterogeneity, which are usually achieved by including a group of intereviewees diverse in their gender, qualifications, professions, etc., the risks of causing more social tensions and fractures within small communities would have been great. It would have been difficult to mitigate conversations considering how at the time politically charged it had become to discuss energy and the future of fossil fuel in Taranaki.

As previously mentioned in this chapter, political and governmental decisions linked to the petrochemical industry and extraction, influenced the way I approached the discussion around fracking and how I formulated questions and the flow of the dialogue with my interviewees. To give a sense of the changes in decisions taken over the past two years, I have created the timeline shown below.



## May 2018

Prime Minister reassures Taranaki locals after end of new oil and gas exploration. Goal is to focus on alternative fuels and energy sources

PEPANZ launches Energy Voices campaign to voice public concerns over the end of oil and gas exploration permit.

## Nov. 2018

Parliament passes Bill banning new offshore oil and gas exploration.

## Feb. 2019

Govt seeks exploration proposals for onshore Taranaki
Almost 2,200 square-kilometres of Taranaki is being offered for oil and gas exploration in the much-delayed 2018 block offer.

## Apr. 2019

New Zealand to commit to Carbon Neutral by 2050 through the Zero Carbon bill. This aims to provide a framework to implement climate change policies.

## Nov. 2019

People vs Oil: activists occupy the OMV support vessel

## Dec. 2019

Questions raised about proposed New Plymouth development's proximity to oil well


As seen, in early May 2018, newly elected Prime Minister Jacinda Arden decided that the New Zealand Government would no longer issue permits for offshore oil and gas exploration as part of its commitment to a clean energy future. As reported, Greenpeace NZ head and former Green Party co-leader Russel Norman acknowledged it was a "historic step" in his press release but also took care to express disappointment: "'We are disappointed that onshore Taranaki, where communities have to deal with ongoing fracking and exploration, is exempt from the ban, and that existing offshore exploration contracts will remain' Norman said" (Cooke 2018).

On November 7th, 2018, the controversial bill banning future offshore and onshore oil and gas exploration in the country was approved and officially passed. PM Jacinda Ardern declared how this decision would help in protecting future generations from climate change (Young 2018). However, the industry began right away to express its perplexities in later months, with different companies complaining that it was a rushed decision, and with associations such as Petroleum Exploration and Production Association of New Zealand (PEPANZ) asking the Government to justify their action with 'proper research'. As the PEPANZ CEO Cameron Madgwick publicly stated "[t]he people most affected by this decision haven't been listened to and now face real uncertainty" (Rennie 2018), impacting thousands of people working in the industry.

These events shaped how I engaged with my participants during my second phase of fieldwork. Whether the government had made a correct decision often became a topic of argument and led to my approach to other areas of inquiry such as what the future of energy will look like for Taranaki and what alternatives were being proposed in the region. These topics became foreground elements of conversation, making it at times difficult to redirect the dialogue with my interviewees toward other aspects of my research. As mentioned, I eventually had to

embrace a level of flexibility and delineate a set of questions to be used more as a general guideline, rather than adhering to a structured format.

*On Kaupapa Māori and reflexivity.* In every situation, I worked to act respectfully towards those I interviewed and interacted with over the course of this research. I had to take into consideration the high level of sensitivity associated with working with a different cultural group and with people who have varying levels of access to power. As a Western-trained researcher, it is important for me to adopt or at least include values and understandings of a Kaupapa Māori-based research and to understand how this would be beneficial (Glynn 2013). Born from a "discontent with traditional research disrupting Māori life, an indigenous approach [as] Kaupapa (agenda/philosophy) Māori" (Bishop 2003:6) presents an alternative to the disruptive Western approach (Smith 1999). As Leonie Pihama et al. (2004:31) outline Kaupapa originates from a history that reaches back thousands of years, and it gives back meaning to the "life of Māori" (Smith 1996). Mereana Taki (1996:17) beautifully describes this:

> Kaupapa is derived from key words and their conceptual bases. Kau is often used to describe the process of "coming into view or appearing for the first time, to disclose". Taken further ka u may be translated as "representing an inarticulate sound, breast of a female, bite, gnaw, reach, arrive, reach its limit, be firm, be fixed, strike home, place of arrival" (H.W. Williams c 1844-1985: 464). Papa is used to mean "ground, foundation base". Together Kaupapa encapsulates these concepts and a basic foundation of its "ground rules, customs, and the right of way of doing things.

As a framework and research strategy, Kaupapa Māori builds around eight principles:

| Principle | Meaning | Objective |
|---|---|---|
| **Tino Rangatiratanga** | **The principle of self-determination: autonomy, sovereignty, independence.** | Asserts and reinforces the goal of Kaupapa Māori initiatives: allowing Māori to control their own culture, aspirations and destiny |

| | | |
|---|---|---|
| **Taonga Tuku Iho** | **The principle of Cultural Aspiration: centrality and legitimacy of Te Reo Māori, Tikanga, and Mātauranga Māori.** | Māori ways of knowing, doing and understanding the world are considered valid in their own right. In acknowledging their validity and relevance it also allows spiritual and cultural awareness and other considerations to be taken into account. |
| **Ako Māori** | **The Principle of Culturally Preferred Pedagogy** | Teaching and learning practices that are inherent and unique to Māori, as well as practices that may not be traditionally derived but are preferred by Māori. |
| **Kia piki ake i ngā raruraru o te kainga** | **The Principle of Socio-Economic Mediation** | This principle asserts the need to mediate and assist in the alleviation of negative pressures and disadvantages experienced by Māori communities. It asserts a need for Kaupapa Māori research to be of positive benefit to Māori communities. It also acknowledges the relevance and success that Māori derived initiatives have as intervention systems for addressing socio-economic issues that currently exist. |
| **Whānau -** | **The Principle of Extended Family Structure** | It acknowledges the relationships that Māori have to one another and to the world around them. Whānau, and the process of whakawhanaungatanga are key elements of Māori society and culture. This principle acknowledges the responsibility and obligations of the researcher to nurture and care for these relationships and also the intrinsic connection between the researcher, the researched and the research. |

| | | |
|---|---|---|
| **Kaupapa** | **The Principle of Collective Philosophy** | Kaupapa refers to the aspirations of the community. The research topic or intervention systems therefore are considered to be an incremental and vital contribution to the overall 'kaupapa'. |
| **Te Tiriti o Waitangi** | **The Principle of the Treaty of Waitangi** | Te Tiriti o Waitangi (1840) is a crucial document which defines the relationship between Māori and the Crown in New Zealand. It affirms both the tangata whenua status of whānau, hapū and iwi in New Zealand, and their rights of citizenship. The Tiriti therefore provides a basis through which Māori may critically analyse relationships, challenge the status-quo, and affirm the Māori rights. |
| **Ata** | **The Principle of Growing Respectful Relationships** | relates specifically to the building and nurturing of relationships. It acts as a guide to the understanding of relationships and wellbeing when engaging with Māori. |

*Table 3: Kaupapa Māori principles.*

Adapted from: Principles of Kaupapa Māori. Retrieved from: http://www.rangahau.co.nz/research-idea/27/

Graham Smith (1993:13) stresses that the researcher who intends to study a community represented by Māori needs to accept culture, language, and knowledge "in their own right" [as cited in Bishop 1999:2]. Understanding that “inherent in this approach is an understanding that Māori have fundamentally different ways of seeing and thinking about the world…,” different ways through which they aim to keep alive their traditional knowledge and their own identity (Mahuika 2008:4). It is also important to consider how relations are created when a strategy of research such as Kaupapa Māori is applied, where relationships are generated beyond the investment in the research, but more toward the creation of a personal link between both parties. It then becomes a spontaneous collaborative approach that considers the concept of

*whakawhanaungatanga*, that is the establishing and maintaining of *whanau* [family] relationships, literal or metaphoric (Mead 2003).

As a non-Māori researcher, I followed the approach of other researchers (see Calabrò 2015; Gonzalez 2010; Sakamoto 2011), in considering how to integrate elements of Kaupapa Māori into my research framework, weaving them with the Western/European methodologies of my training (Cram 2001:38). During this process I was influenced in my approach by a series of questions outlined by Linda Tuhiwai Smith (1999:173) when conducting research with indigenous people:

- •Who defined the research problem?
- For whom is the study worthy and relevant?
- Who says so?
- What knowledge will the community gain from this study?
- What are some likely positive outcomes from this study?
- What are some possible negative outcomes?
- How can the negative outcomes be eliminated?
- To whom is the researcher accountable?
- What processes are in place to support the research, the researched and the researcher?

These questions supplied a useful guideline to follow in the fieldwork and post-fieldwork phases as I questioned the relevance of the project for the various communities and the possible positive and negative outcomes that could result. In addition, I was able to reflect on my role as a researcher/ethnographer dedicating in each stage of my research to go over findings and my own perceptions, allowing me to take a step back from what I had gathered from discussions with my interviewees.

I bring a reflexive approach to this dissertation; being reflexive is an intrinsic element of any individual's mindset. Reflexivity is the ability we have to be constantly aware of ourselves and to maintain contact with the reasons why we engage in certain actions. Hammersley and Atkinson (2005:15) explain how "[t]he concept of reflexivity acknowledges that the orientations of researchers will be shaped by their socio-historical locations, including the values and interests that these locations confer upon them." This reflexive approach has become a significant feature for social research, as the "recognition of reflexivity [implies that] there are elements of positivism and naturalism which must be abandoned; but it does not require rejection of all the

ideas associated with those two lines of thinking" (Hammersley and Atkinson 2005:15). As Barbara Myerhoff and Jay Ruby (1982:1) stress, reflexivity helps to heighten awareness while at the same time intensifying the possibility of turning back to contemplate ourselves.

Reflexivity appears as an anthropological praxis that can often be seen as the expression of personal experiences narrated through the use of the first person. G.H. Mead (1934) points out that by doing so we are able to include the whole social process into our own experience, making it possible for the single individual to reach a deeper understanding. This understanding is not just of what occurs around him or her, but also of what occurs within himself or herself, bringing those aspects to modify his or her own behavior as well as the social process itself. Vivien Burr (1995) asserts that reflexivity has been perceived as an obstacle for the researcher who wishes to receive the stamp of authentication that his/her own perspective represents the truth or full knowledge on the subject. However, the goal of being objective is an impossibility as each of us encounters the world from their own perspective and our theories and hypotheses are developed based on the assumptions that are part of our own perspective. What becomes important is realizing that when studying or analyzing a certain aspect of culture, it is not possible for researchers to exclude their own experiences from the analysis.

Understanding that the researcher is included in his/her own work and cannot remain a detached observer of a reality in which he or she is active (MacDougall & Taylor 1998: 88-89) means realizing, as Ruby (1977: 11) points out, that "[r]eflexivity offers us a means whereby we can instruct our audiences to understand the process of producing statements about the world", a process that often is more difficult than it seems.

# CHAPTER FOUR: FRACTURES IN A FRACTURED LAND: HOW EXTRACTION HAS CONTRIBUTED TO CHANGES IN A SENSE OF PLACE

"Have you got good shoes?" Rodney asks me as we end our interview. He wants to show me around his property—61 hectares of land, 4 km from the coast and 480 feet above sea level. He explains that he inherited this place from his parents. Rodney and his family moved to the area around 1953 and spent the rest of their lives in this place planting trees. After travelling around the world, Rodney came back to this place, and re-discovered that working with trees was what brought him joy. The affinity for this place, its fauna and flora, is what made him stay here for the past 25 years. We walk across an open patch of grass and there are a couple of cows grazing in the early afternoon sun not far away. It is a balmy day in December; the cicadas are singing loudly. He says he often goes for walks to where his father's house used to be, approximately 1 km from where he resides. We take the path toward the forest as Rodney describes the different species of trees planted, where they come from, what their characteristics are, and so on. A chorus of birds soon fills the atmosphere around us as the swooshing of branches and the occasional cicada accompany their orchestral sounds. Rodney shows me different trees, picking up for me a small wild strawberry. To feel and be at home is to have created an emotional and psychological attachment through generations. For Rodney, this place is full of meanings leading him to feel a deep connection to it. "This is my tūrangawaewae, the place for my feet to stand. I think I am blessed to have such a place because a lot of people…they are always looking for something more. And for me here, I found what I want," he says. Tūrangawaewae is a Māori concept often used to identify places where we feel especially empowered: our foundation, our place in the world, our home. Michael D. Jackson (1995:7) describes the intimate and sacred connection created with the land based on a relationship that transcends ownership and reinforces that sense of belonging shared among the generations, including those who have passed on and those yet to be born: Whatu ngarongaro te tangata, toitu te whenua. (As man disappears from sight, the land remains).

*Figure 17: Rodney walking through the forest*

Rodney deeply connects his life and upbringing to this land. As I listen to his passionate description of the trees and the area where he grew up, I think of how his notion of place and sense of belonging has been shaped and how it could be affected by any damage or change that could occur. Rodney also addresses his feelings of anxiety and sadness in considering the eventuality of that change.

This anxiety is a common feeling that interviewees expressed as I investigated their sense of place, particularly those living closer to hydraulic fracturing operations and wellsites. In this chapter, I present an overview of the concepts of place, space, and sense of place to better offer an understanding of how environmental degradation (or its potential) can create feelings of disconnection and discomfort within a community. Drawing from similar case studies linked to extraction, I argue that the close proximity to petrochemical facilities and hydraulic fracturing operations can lead to a sense of desensitization and deterritorialization as described by Valerie Kuletz (1998) and Nestor Garcia Canclini (1995), as well as to what Glenn Albrecht (2005) defined as *solastalgia*, a neologism that describes the emotional and psychological distress caused by environmental changes. By exploring the literature around these concepts, I offer an analysis of the social impacts and changes in the sense of place experienced by my interviewees, discussing elements of environmental degradation they have observed in their surroundings.

## Notions of Space and Place

Place can be complicated but yet narrowed to a simple definition: a notion shaped and constructed through not only human interactions and history, but also through social and political elements, and influences from other places. In the 1990s, Basso (1996:54) argued that anthropology had lost touch with notions of place and that of "a thematized concern with the ways in which citizens of the earth constitute their landscapes and take themselves to be connected to them" has been completely forgotten. Since then, partly as a response to Basso's critique, the concept of place languished within fields such as geography, but in anthropology, the idea of places as producing meaning and the concept that meaning can be grounded in place has received more explicit theoretical interest. Place as a geographical term is a simple and self-referenced concept, trivially definable in reference to a portion of space occupied by a thing or a person. According to this definition, place is a concrete physical element, a precise location in space that contains something (Relph 1996). However, at least two other elements are intertwined in the notion of place: the local (where social relations take place) and socialization (the geographical area of the social and economic processes that operate on a larger scale) (Agnew 1987). While the first identifies the area in which social interaction is structured, the second refers to processes operating on different scales. In a place we weave our social relations and

within that place we trigger relational processes of wider scope. The discourse about place is not limited in its definition: it is not just a container, but as Mike Crang (1998) argues people define themselves through place. The place becomes a set of features with a distinct personality.

Place is therefore a fundamental interpretative category, built and rebuilt to give meaning to the space in which one moves, and in which one acts. It is, in a certain sense, the symbolic context that we develop to act in the world. Space is generally understood as an indeterminate extension (a house, a mountain, a room) that is objectively posed to human experience. Territory is space organized and transformed by individuals and social groups and is understood and organized according to legal relationships (this river, my room, our city). Place, on the other hand, is the territory as it is represented in the subjective experiences of the individuals and communities that inhabit it and characterize it, with their activities, their traditions, their cultures. It is in places -that is, in lived spaces where the emphasis is more on lived than on space- that the experience of human subjectivity is generated and articulated. Yi-Fu Tuan (1977) highlights how the interpretation of space can be implemented through an abstract structure: the language of mathematics and quantifiable data. However, in the humanistic perspective the concept of place embraces different meanings based on the approach used in observing reality. A place is a single entity, it has a history and a meaning, and it is a reality that must be understood through the vision of the people who have attributed it and attribute a value to it.

For Denis Cosgrove (1984), place as landscape is a sophisticated 'ideological concept' as it can become a way in which people create meaning of themselves and their world through their imagined relationship with nature, and through which they have indicated and communicated their social role and that of others with respect to nature. According to Cosgrove, it is not sufficient to analyze the landscape only in its 'visual' aspects (aspects related to the natural components such as the environment, climate, or morphology or economic activities such as the material culture of the local group); it is the values, meanings, and various social processes that cover and overlap place that are increasingly important. Place is composed of three elements: the physical and tangible characteristics of an area, the measurable activities of man, and the meanings or symbols imprinted on human consciousness (Cosgrove 1984). It is the third dimension, the symbolic meaning, that gives a place a precise ideological and artistic connotation. The artistic meaning comes second—after the ideological. A landscape is a cultural image, a figurative way of representation and a structuring or symbolization of environments. A

park is more tangible, but it is neither more real nor less imaginary than a landscape painted or present in a literary work. The definition of landscape as composed of three elements was first described by Edward Relph (1976) and later used by him to define place. Place/landscape is considered the fundamental territorial structure to be interpreted according to the Relph-Cosgrove merged definition: space is composed of three elements: (1) a natural basis on which a socio-economic structure is organized; (2) a set of meanings and symbols (the genius loci and the symbols connected to it); and (3) impressed by the culture of the society that operates there.

Relph (1976:47-48) argues that a place assumes identity through three elements: the physical base, the activities that take place, and the meanings attributed to the physical base and the performed activities. The difference between the experience of a place and any portion of space is inherent in the different relationships that humans have with each space. The first implies a relationship of interiority, while the second implies a relationship of exteriority. The external relationship can be existential, objective, or incidental. For an existential relationship, conscious non-involvement is implied: an alienation from certain places and people, essentially a sense of non-belonging. An objective relationship manifests itself through an attitude of voluntary detachment from the territorial context, resulting in a separation between places and people. Finally, an incidental relationship occurs when the detachment towards places takes on an unconscious character and places are considered only as a background to human activities.

According to Relph (1976), 'vicarious insideness' is the perception we feel when we experience places without visiting them. It is possible to experience feelings of deep involvement and belonging based on the imagination and the emotions it procures. Behavioral interiority consists of being in a certain place and experiencing place as a set of objects, activities, and environment, to which attention is deliberately paid. In contrast, introspective interiority involves a willingness to open oneself towards place as its symbols and expressions of the cultural values of those who live in a particular place. Existential interiority implies an unconscious relationship with the place, profoundly significant, and therefore a sense of belonging and profound identity. The space perceived as a place becomes an affective object, a matter of love, of topophilia, or even of fear or anguish (Relph 1976). Places are therefore essential components of our experiences of the world:

> In short, those aspects of the lived world that we distinguish as places are differentiated because they involve a concentration of our intentions, our attitudes, purposes and experience. Because of this focusing they are set apart form the surrounding space while

> remaining part of it. Places are thus basic elements in the ordering of our experiences of the world. (Relph 1976:43)

Vincent Berdoulay (1989:135) pointed out that place not only features in inhabitants' narratives, but it has an active role in the narrative as well: "a place comes explicitly into being in the discourse of its inhabitants, and particularly in the rhetoric it promotes. Thus, the geographer's discourse uses the same ways as the people who define their own place." J. Nicholas Entrikin (1991) states that such discourse joins conceptual ideas with the real world. In his book *The Betweenness of Place*, Entrikin (1991:134) asserts that in order to address both an existential and naturalistic conception of place it is important to consider this aspect "from a point in between, a point that leads us into the vast realm of narrative forms. From this position we gain a view from both sides of the divide. We gain a sense both of being "in a place" and "at a location," of being at the centre and being at a point in a centerless world. To ignore either aspect of this dualism is to misunderstand the modern experience of place." Within anthropology Feld and Basso (1996) state that human existence has been always situated in time and space and overlooking the influence that environment can exercise over the creation of traditions, beliefs, and stories that can lead to missing half of the picture portrayed about a community and/or culture. Until recently, little recognition has been given to place as more than a locale or a setting for action, along with the idea of place as a basic dimension of human experience. Anthropologists had bracketed 'place' in a box and set it aside (Hirsch and O'Hanlon 1995). The disregard toward the notion of place within social science can be puzzling since "it [appears as] inevitable [to have an] immersion in place, and not the absoluteness of space, that [instead] has ontological priority in the generation of life and the real" (Escobar 2001:143). Basso states that what it was missing was "a desire to fathom the various and variable perspectives from which people *know* their landscapes, the self-invested viewpoints … from which … they embrace the countryside and find the embrace returned" (Basso 1996:54). Anthropologists are here concerned with the "emplacement of … cultural practices, which stems from the fact that culture is carried into places by bodies—bodies are encultured and, conversely, enact cultural practices" (Escobar 2001:143). In Margaret Rodman's (2003:21) critique, an anthropological conception of place provides taken-for-granted settings to situate ethnographic description that analytically become metaphor or "are reduced to a locale that imprisons natives." However, places cannot and should not be seen as inert containers as each place is "politicized, culturally relative, historically

specific, [and of] local and multiple constructions" (Rodman 1992:641). What happens is the idea of place is seen as becoming deployed by the anthropologist in order to frame his position in the field. Place serves to create the appearance of objectivity through the ethnographer's study, reducing the space to a picturesque portrait of the relationships people have with the environment. In such an approach, traditions and cultural practices appear as part of the fixed landscape, with a complete absence of any form of dynamism or change. However, place is not static. Place is still seen as being made "by sedimented social structures and cultural practices" (Escobar 2001:143). Such approaches do not acknowledge the role of sensing, moving, and perceiving, and, more importantly, the idea of place as something existing beyond human presence is not acknowledged. The result is that place comes to be seen as solely the result of habitual cultural and social processes (Escobar 2001). But as Casey (1996) describes, place is more than that: it is linked to personal and cultural identity, and through places it is possible to explore the creation of self-identity. Christopher Tilley (1994:14-15) adds "[g]eographical experience begins in places, reaches out to others through spaces, and creates landscapes or regions for human existence."

Anthony Giddens (1990) states that an alteration of the spatial and experiential pattern occurs by combining proximity and distance according to frameworks and models. These models carry fewer analogies of what the past linked to the place was, and inevitably modify the bond created amongst people and places. Arturo Escobar (2001) emphasizes that the process of modernization does not impact the importance of place:

> place continues to be important in the lives of many people, perhaps most, if we understand by place the experience of a particular location with some measure of groundedness (however, unstable), sense of boundaries (however, permeable), and connection to everyday life, even if its identity is constructed, traversed by power, and never fixed. (Escobar 2001:140)

A misportrayal of how important place is can result from its association with the controversial concept of globalization leading to the misconception of place as a homogeneous global entity (Robinson 2003). Often globalization itself is viewed as a "unifying [force able to transform] the world into a single mode of production and a single global system and bringing about the organic integration of different countries and regions into a global economy" (Robinson 2003:13). Contrary to this idea, Mike Featherstone (1995) argues that the process of globalization emphasizes that there are various levels of experience within a place. He further explains that a

global culture does not necessarily imply a common culture, rather a unique vision of the landscape. Place should be seen "as a field in which differences, power struggles and cultural prestige contests are played out" (Featherstone 1995:14). The concept of place must then be seen as constantly being re-shaped by people's continuous construction of "some sort of boundaries [that are] permeable, and to be grounded in local socio-natural practices, no matter how changing and hybridized those grounds and practices might turn out to be" (Escobar 2001:147). John Tomlinson (1999) stresses this aspect, explaining that through globalization every place has always been characterized by particular traditions and specific identities. However, the expression and passing on of traits from generation to generation seems to be disappearing increasingly every day. The local cultures appear to be lacking an anchor to a distinct place, leading to the idea of displacement (Giddens 1990) or delocalization. Giddens states:

> The advent of modernity increasingly tears space away from place by fostering relations between "absent" others, locationally distant from any given situation of face-to-face interaction. In conditions of modernity, place becomes increasingly phantasmagoric: that is to say, locales are thoroughly penetrated by and shaped in terms of social influence quite distant from them. (Giddens 1990:18-19)

## Phenomenology of Space and Senses of Place

Attending to a sense of place recognizes not only the emotional bond, but how the complex socio-economic and political processes are also integral to it. Too often this concept is seen as a barrier to sensible resource management and the different levels of place meanings are often not given equal importance within its politics. As Daniel Williams and Susan Stewart (1998) point out, sense of place has a complex, multifaceted nature that they effectively describe through five distinct points:

1) The emotional bonds people create with place over time;
2) The values, meanings and symbols generated as a result of the familiarity with the place, but which can be also perceived by outsiders;
3) Qualities of the place that an insider could not be consciously able to detect;
4) Place meanings "actively and continuously constructed and reconstructed within individual minds, shared cultures, and social practices";
5) Attention to the influence that cultural, historical and spatial context exert on the creation of those meanings, values, and the social relationships created through them. (Williams & Stewart 1998:19)

Given the many dimensions attributed to sense of place, competing senses of place should not be dismissed just because they do not confirm to what Williams and Stewart (1998:23) refer to "some expert's technical sense of place. [This instead must rather] be acknowledged if not embraced for resource management to succeed." For phenomenologists, a key aspect in understanding what is meant by place is being aware of the action of perceiving. This action includes the sensations and sensory data received through the environment itself. Gathering perceptions will eventually lead to knowledge about a particular landscape. From a phenomenological point of view, landscape becomes the idea of place, sensations, and spaces where knowledge of the place "is [an] ingredient in perception itself. … To live is to live locally, and to know is first of all to know the places one is in" (Casey 1996:18). Place includes things, thoughts, and memories based on particular configurations and it conveys "openness rather than … a unitary self-identity." (Escobar 2001:143)

Martin Heidegger (1972) proposed topological thinking, in which the relationship between people and the landscape becomes a matter of 'thereness' of the self-disclosure of being in and of the world. Tilley (1994:13) states "existence is spatial in that it opens onto an outside world of a series of reference points. Similarly, Maurice Merleau-Ponty (1981) argued that the human body is a mediation point between thought and the world, transforming space into an existential phenomenon. "[T]he whole life of consciousness is characterized by the tendency to posit objects [into space] since it is consciousness, that is to say self-knowledge, only in so far as it takes hold of itself and draws itself together into an identifiable object" (Merleau-Ponty 1981:71). As Basso (1996) explains, it is seen as imperative to 'get back into place' by recognizing the idea of place, body, and environment as interwoven and integrated with each other. Gillian Rose (2001) argues that a community's sense of belonging to a place can develop at different scales: local, regional, national, and global. Some places, however, incorporate all these scales and have a different sense depending on the particular perspective of the beholder. Through the experience of being in a place and inhabiting a space, the physical landscape can multifocally shape and express polysemic meanings of place for different users (Rodman 2003). This aspect is what Rodman (2003:212) defines as a multifocal dimension of place (or multi-locality) that helps to convey the phenomenological perspective that a single place may be experienced differently from person to person.

## Deterritorialization as Deterioration of a Sense of Place

People's senses of place have been shown to be modified with the deterioration of local landscapes following the environmental impact of activities, whether these are caused by mining (Kirsch 2000), nuclear waste disposal (Kuletz 1998), or oil spills (Kaltenborn 1998). In modern landscapes we face rapid changes through which the vision of what it means to be connected to a place becomes shaped by the shifting of territorial and non-territorial boundaries resulting in confusion regarding what place means. An individual and/or community can question their sense of place and their notion of belonging when their backyard, the field across from their school, or the area next to their farm is exploited and destroyed.

During my fieldwork, my interviewees reflected on their sense of place and how the presence of the oil and gas industry in their region and the rapid increase of hydraulic fracturing operations have impacted the way they experienced feeling at home. For many, a sense of respect toward their land, mother earth (*Papatūānuku*) is paralleled with a sense of anguish and disempowerment when seeing the changes in their surrounding environment. The anxiety of not fully knowing the eventual impacts of extraction on the land and the people living on it it is what brought those I interviewed to adopt one of two strategies: either fight against those changes or avert their eyes to protect their emotional well-being. For other interviewees familiar with the oil and gas industry activities but who do not live close to wellsites or production station areas it has been easier. As Margaret pointed out to me: "Out sight, out of mind." In her case, the number of wellsites near her property have increased drastically in the last few years, popping up among the hills and farmland of the Waitara valley. She points out that it has become a standard for many who work or live near fracking facilities to avoid discussing any aspects of this practice with their families and/or pretend not to see fracking happening across their fields in order to carry on a life with less tension, conflict, and worry. Family ties and relationships with neighbours and friends can deteriorate as the landscape itself deteriorates from the practice, eventually changing the way one would relate with their place. Despite these feelings of anguish and stress, Margaret showed a resilience through her words and in her eyes staying optimistic for the future not just for her wellbeing but, more importantly, for those of her grandchildren:

> My sense of belonging to Waitara, to the river, to the mountain …it is just as strong. Maybe stronger now. That's why I try to say something to what it is happening. /…/ We have my grandchild on the property and I think … how he's going to be affected?

> …eating the meat, eating the vegetables, drinking the water …. next to all those wellsites. We could move but where to? I have been developing a property that I want my family to occupy for centuries. I believe that we will outlive them. That they will be gone, and we'll still be there. I have to think that otherwise I will get mentally unwell … I have to find some hope.

For others, staying engaged and informed on extraction activities in the area and the linked impacts opened a Pandora's box impossible to close. Sarah said that learning the way fracking has been regulated in the region has led her to a path that she would have not imagined 10 years ago. Going from living a quiet life to finding herself standing in legal courts to oppose changes in her backyard and limit environmental and health impacts to her family. Regarding my question on how her sense of place has developed throughout this process she said it was difficult to unlearn what she now knows:

Sarah: You can't put the genie back in the bottle. It has been shaken in such a way that you know …imagine if there was an earthquake in this room and everything was lying on the floor, and you try to pick up a chair, you pick up a chair and it gets keep blown… it is that feeling *ALL the time. ALL the time*. You pick up that chair, and something happens again, and you have to pick up the chair again. So just recently, probably… the application for fertilizer has been publicly notified. Energy Watch and Climate Justice submitted on that because they are using drilling waste up there and there is compost in that. And we are not sure whether here are potential putting fertilizers that are then unsolved. What the understanding is in the application what limit they get to before passing it onto the consumers. So, our feeling about it when we look about the science behind it it is basically similar to a landfarm, put the stuff there … and in a landfarm, if it was just a landfarm, rubbish dump … just a dump to put your contaminated BTEX waste or whatever waste it is, it is fine only if it is what it is used for until it is remediated. So, it is like a revital fertilizer[31]...is like …you got this stuff that is put on this land and there is no sense of the application yet, we haven't gotten through the human process, that is at any point bagged off and sendoff to be used somewhere else. Because if it is not, then what you then create is a huge amount of drilling waste that comes in there basically being placed all over Taranaki, or whatever it goes to. Because it is nationally. If you visualize that happening, can you see what I see?

Anna: Hmmm

Sarah: So when I say that it feels like an ongoing earthquake shaking it is because the revital fertilizer chair has fallen over, the hydrogen chair has fallen over …cause they want to build a hydrogen plant in port Taranaki. And we know that it is probably not the best place to build that. And they want to make urea there. And we also know because of our knowledge of urea plant and risks of blowing up. And it is probably not the best place to do it there either. So even if we might not like those companies, if they can operate

[31] Remediation NZ produces fertilizers under the trade name Revital. In Taranaki, the company runs three field sites: a composting and vermiculture operation at Mokau Road, Uruti (since 2001), and vermiculture operations at Waitara Road (since 1998) and Pennington Road (since 2001), in Brixton (Taranaki Regional Council, 2013).

somewhere, this has been Energy Watch and my understanding on how we feel about it, it is that, if they operate somewhere and it is appropriate to the location, they are not harming anyone, we have not any legal reason to stop them. But if they are going into a space that can go BAM! They are going to take half the population of New Plymouth. And we don't think that's appropriate. And it is exactly the same premise as the seismic to exploration, and production. We follow the same guidelines. So, we are not saying don't operate. We operate in a manner that makes us calm and we have no legal opposition to you, we might not like your industry, we might not support your industry, but we can set that aside and we can just look at those aspects. That is a localized effect of this industry and that doesn't go anywhere near addressing climate change.

A psychological and emotional earthquake has impacted the way Sarah experienced her land and the trust she once felt toward regulators and councils responsible for managing oil and gas activities in Taranaki:

Sarah: People have said to me, someone has to make the sacrifice. Or actually how can you agree to make that sacrifice when you don't even know you are sacrificing in the first place? You only having to sacrifice happen because they haven't told you about it. If they told you about it, would you choose to live there with your family? That was one of the reasons why we chose not to go back to the farm. Cause I couldn't cope to live there again. We were considering it. I couldn't cope to take… I might have chosen to go there myself, but I couldn't take my grandchildren there, because I would be putting them in a situation, they had no understanding of it. And risk as well. I couldn't go back. I couldn't go back even if I wanted to. So that sense of place. It has robbed us of our home. Yep. It doesn't finish. Yep. Because these people…. And I can't even name names, not because I don't want to, but it is a generic thing …These people don't live beside them, they don't live with the risk. They fight the risk all the time. And sit here and hear them on the court and think "if *YOUR* family was here, what would you be doing?" Yep. So, it is sad. It is sad and you have to pack that sadness because if you are sad all the time, you wouldn't keep doing this stuff. Because it will cripple you. But you know …you have to keep doing it, you have to see it through it and there is lots of people before me, and there will be a lot of people after me.

Another interviewee pinpointed a similar feeling of sadness. Abbie greeted me from the entrance gate of her gardens with a big smile, inviting me in her house to sit for our interview along with her two small dogs. She explained to me how she has helped take care of their private garden on a property that has belonged to her husband's family since the late 1800s. One of her husband's ancestors, Thomas Jury, purchased a piece of land at Tikorangi in North Taranaki back in the 1870s. An avid tree planter, Thomas Jury's legacy is still visible around the garden with

different rimu[32] trees he planted still standing. In the 1950s, Felix Jury and his wife planted the present gardens. The garden has been a rewarding business for Abbie and her husband, and for years they have welcomed the public and opened it to paid visits. The design and landscaping were heavily influenced by English-style gardens and is still an ongoing project admired by many during the Taranaki Garden Festival[33] and other events held throughout the year. The Tikorangi Jury Garden is located near Oataraoa Road, which has been heavily used by fracking companies and trucks carrying equipment and discharging fluids from Mangahewa Wellsites and McKee production station.

*Figure 18: View from the Jury's Garden. Photo by the author*

[32] Rimu is a large evergreen coniferous tree endemic to the forests of New Zealand.
[33] The Taranaki Garden Festival is an event that has been held annually since 1986 to celebrate local gardeners and is open to the public.

*Figure 19: View near the house. Photo by the author*

*Figure 19: Some of the flowers in Jury's garden*

Abbie and her family have been deeply impacted by the increased traffic and road problems caused by the intensified oil and gas activity in the Tikorangi area. She described to me how the constant noise remained unbearable even after they adopted measures such as double-glazed windows to reduce the impact, as suggested by companies. Knowing that wellsites are present so close to their property created a lacerating wound in their lives.

Anna: How distant are from here the different wellsites?

Abbie: There is a well site that is 800 m. The other one is 1.2 km. About 1000 meters. I think I measured it on the website. Todd have claimed… when they originally filed for that site. that was still in use 2011. They only had 70 percent of the neighbours on the list. I will drive on the road. Counting every house and residence. 3-4 times as many people people they declared. Then updated it. Then they tell the court that we are 1200 mt away and it would not have any affect on us. So why the hell were we on the evacuation list? Don't know. Not clear no transparent.

In 2014, Abbie and her husband Mark decided to close the garden to the public as the stress was overwhelming[34]:

Abbie: New roads, new traffic. And it was that terrible sense of grief of what happened. 2014. It was a discovery of that concept of solastalgia that made me think "I am not planning to end my marriage. Mark will never go and I need to learn how to live here". I stopped photographing the trucks, petrochemical sites. Just withdraw. And simply for my own mental well being. 2007-2011-2014. I used to go away to Auckland for weekends and I will drive home and my heart will sink. I just didn't want to come home. I reached a point saying "if this wasn't a family property, I will be gone. I will go anywhere". My husband would ask me not to say that because it would upset him. He doesn't ask much. If we were not family linked to this place I would be gone. I don't know where. I wrote a post once about solastalgia. That sense of… grief. At the change of a place. It just captured it perfectly for me. And it was a sense of grief at the changes. It was awful. At that point I was so close to snapping. That…I had to back off. I was going to drive myself to a total breakdown. So I did back off and I have stayed backed off for some years now.

Abbie's curiosity and passion for writing have led her to keep a blog, regularly updated since 2010, in which she records her experiences of fracking. In the course of these activities, Abbie came across a term that, as she explained to me, helped her to define her living situation and the emotional turmoil she had been going through. Abbie then read aloud to me what she had written in her blog [35]:

Abbie: Oddly enough, I find being able to put a name to the sense of loss and grief I feel at what is happening to our beloved area of Tikorangi is helpful. Solastalgia: *the distress that is produced by environmental change impacting on people while they are directly connected to their home environment.* Faced by the high impact of petrochemical development around us on every side, I now refer to the Tikorangi Gaslands. The tragedy is that it is not a joke / …/ But we now have the petrochemical industry all round us and down this formerly quiet little country lane is the huge Mangahewa C site with its eight gas wells, single men's camp and much additional activity. The road has been strengthened and widened for their heavy transport, all done in such a way as it is now impossible to walk along the verge. It is sometimes referred to as "loss of rural amenity". Children can no longer walk safely to and from school bus stops, cycling is not safe, forget horse riding. It is pretty difficult to find a safe position to stand clear when the heavy transport thunders by. Meantime, across the intersection, the other side of Tikorangi Road—largely unused by the petrochemical industry—has remained unchanged over the past 20 years. It is a stark contrast.

[34] After more than six years of being closed the garden has been recently reopened to the public during the COVID-19 pandemic.

[35] "Solastalgia – the story of our corner and changing times." Retrieved from: Tikorangi The Jury Garden– Mark and Abbie Jury. Blog: https://jury.co.nz/2014/12/14/solastalgia-the-story-of-our-corner-and-changing-times/.

I had been exploring the concept of solastalgia just prior to my return to Taranaki, and so I was surprised and delighted to learn that the concept, still new to me, had resonanated similiarly with Abbie when she first encountered it. Solastalgia[36] is inspired by the Latin roots for the word 'solace' and its opposite, 'desolation,' and the suffix algia or pain. The word combines these word bases with a reference to home and nostalgia. Solastalgia was coined by the philosopher Glenn Albrecht (2003), aiming to describe a melancholia connected to a lack of that harmony experienced when one is home and surrounded by a deep desolation caused by the ongoing biophysical changes occurring in the individual's environment:

> The factors that cause solastalgia can be both natural and artificial. Drought, fire and flood can cause solastalgia, as can war, terrorism, land clearing, mining, rapid institutional change and the gentrification of older parts of cities. I claim that the concept has universal relevance in any context where there is the direct experience of transformation or destruction of the physical environment (home) by forces that undermine a personal and community sense of identity and control. Loss of place leads to loss of sense of place experienced as the condition of solastalgia. The most poignant moments of solastalgia occur when individuals directly experience the transformation of a loved environment. Watching land clearing (tree removal) or building demolition, for example, can be the cause of a profound distress that can be manifest as intense visceral pain and mental anguish. (Albrecht 2005:45-46)

Albrecht (2007:52) observed the distress occurring in Upper Hunter region communities of New South Wales in Australia, a region that "has been the subject of rapidly expanding open-cut coal mining and power industries." Mining activities there since 1987 have brought deep change to the landscape and created long-term impacts to ecosystem health:

> They are having their lives made intolerable by the wholesale assault on the ecosystem health of the bioregion manifest as toxic air pollution, constant noise, excessive dust and increasing salinisation of the Hunter River. The net result is a community in a stressed landscape where stressed people experience the deep distress of solastalgia while others (the region and the State) profit at their expense. (Albrecht 2005:54)

Albrecht argued that many of the words available in the dictionary were not suitable to name what people were experiencing as they saw the place they called home being disrupted without being able to stop the environmental degradation:

> The people in the Hunter Valley I was focused on were still "at home," but were feeling a melancholia similar to that caused by traditional nostalgia related to the breakdown of the

[36] I was familiar with the term solastalgia and it was a serendipitous moment to discover that one of my participants has used and was familiar with this concept as well.

> normal relationship between their psychic and emotional identity and their home. These people were losing the solace or comfort once derived from their relationship to a home that was now being desolated by forces beyond their control. (Albrecht 2019:32)

Albrecht described how rural and farming communities' sense of attachment to their land is usually stronger. When the values the community associated with rural life were being disrupted, this event could create a condition close to the concept of nostalgia, after the Hoferian definition. Hofer was a Swiss medical doctor who coined the concept of nostalgia to indicate that feeling of sickness experienced by the intense desire of returning home.

> According to Hofer, the symptoms of nostalgia included a whole range of psychological and bodily afflictions, ranging from intense sadness to palpitations of the heart. He suggested that nostalgia was most likely to be experienced by people who were forcibly or deliberately removed from their home environment, such as soldiers transported to fight on foreign soil. In addition to war, other forms of prolonged absence from loved home environments were a likely cause of nostalgia. (Albrecht 2019:30)

Albrecht (2019:30) also stresses that the original meaning of the word nostalgia is relevant in explaining "contexts where people closely tied to traditionally occupied homelands are forcibly removed, or have no say in the matter of being displaced." Casey (1996) forwarded the notion of 'place pathology' where suffering is perceived by people when a place becomes unhealthy and they are displaced and can not go back to it. Albrecht (2019:31) acknowledges this notion and adds that the notion is not representative of the state of mind experienced by those still living in an eroded place:

> While I could see that "place pathology" was a useful term to explain the plight of people in mining-affected communities, Casey was mainly focused on people who were displaced and could not "re-enter" lost places. In the Hunter Valley, there were already many farms and villages that had been lost in this way to mining. You simply cannot live next door to an active coal mine, and many were forced to sell to the company and leave their farms. These people became displaced and were forced to go elsewhere to become re-emplaced. Many writers and researchers examined this process of dis-emplacement and its impact on the emotional life of people, but very few focused on places that were not completely lost, nor strictly pathological in the sense of causing disease, but were impacted by forces that made the people living within them feel distressed, diseased, or ill at ease The negative transformation of a loved place triggers a negative emotion in the whole person who is still emplaced. Their love of their place remains, but they want back those positive elements of place that gave them such a positive sense of place prior to the "invasion." (Albrecht 2019:31)

In the context of resource extraction, changes in sense of place can bring one to perceive the landscape and the relationship one has with it differently. The idea of solastalgia can also be linked to the concept of deterritorialization as discussed by Garcia Canclini (1995). Deterritorialization represents "the loss of the natural relation of culture to geographical and social territories," in which a connection between place, culture, and identity goes missing (Garcia Canclini 1995:229). With regards to globalization and migration movements (see Appadurai 1996), deterritorialization can also be described as an experiential pattern of how one experiences the notion of place, leading to a different perception, vision, and management of the landscape. Regarding territorialization and reterritorialization, Deleuze and Guattari (1972) applied this notion to the psycho-cultural effects of capitalism. Deterritorialization is seen as the movement by which one leaves a territory (Deleuze and Guattari 1972), a phenomenon occurring in a continuous flux with a certain degree of intensity and speed. Deleuze and Guattari (1972) see the physical place as something inseparable from the carriers of deterritorialization working from within. Nikos Papastergiadis (2000) explains:

> [t]he cultural dynamic of deterritorialization has decoupled previous links between space, stability and reproduction; it has situated the notion of community in multiple locations; it has split loyalties and fractured the practices that secure understanding and knowledge within the family and social unit. ([Papastergiadis 2000:117] as cited in Elden 2005:9)

Papastergiadis (2000) notes that deterritorialization of culture is linked to how people experience a sense of belonging to various communities. This sense of belonging exists although they might not share a common territory with all the other members or when there have been changes within the territory. Attention is given to community interconnectedness despite being spread across considerable distance "and redefined through exchange across multiple borders" (Papastergiadis 2000:116). An aspect that "has challenged the classical ethnographic assumptions that cultures could be mapped into autonomous and bounded spaces" (Papastergiadis 2000:116).

This kind of deterritorialization is connected to environmental degradation that Willow (2014:240-241) says "disrupts geophysical processes and transforms [deeply] ecosystems extending far beyond the physical environment and into the realm of the social and cultural life." The result is a modification of communities' social fabric: where once members were supportive and caring toward each other, now there are tensions and disagreements. F.C. pointed this tension out in our conversation as she described the negative reactions she has received through the years to her efforts as an activist and artist:

F.C.: The community, no sense of community. Because if they were genuine, they would be quite kind to me. But they are not. […] I have been told that I should stop *being a nuisance.* I am not being a nuisance.

The divergence and differences in opinions have brought divisions and tensions among community members, at times alienating some and leading to a sadness when thinking of how the community has been impacted by the industry's presence:

Anna: You think that community members that have the opposite perspective are desensitized by the company's presence, or other reasons

Abbie: Hmm… I don't know. The last experience completely alienated me from the Tikorangi community. I had a visit…we had a working group, me and two other friends. We would work with the council and meet every 6 weeks. And work through the issues and what could be done to manage better. Then it fell apart and the council will negotiate with Greymouth Petroleum. And every time we met, they would say the progress with Kowhai C was on hold, but it wasn't. They were processing. I just refused to spend time with councilors. After that H.P. came to visit me. Very clean and proper "Your content is brilliant. Your information is terrific. Could you soften it down a bit? Be nicer. Be gentler". And I couldn't believe it. I have never forgotten that. I should have turned and said, "Fuck off". It was all about her father. He was an outstanding member of the community and he didn't like how I presented it. It was her task. You don't get anywhere with council if you aren't tough. You don't get anywhere if you are nice. They barely listen. And That was it for me. I thought "get out. Just get out". And I have nothing to do with it. Very little community left. I am surprised we got along for 2-3 years. A miracle. Also at the same time, Todd Energy will give different information and undercut what I was saying. While being nice to my face. That is part of the issues. It was safe for them to break that network. And I think that it is the way they operated. I think the impact on the community has been devastating.

M.B., former mayor of South Taranaki District, explained that the lingering mistrust from both sides is what has created tensions and people have learned to avoid discussing the topic in order to protect their own relations:

M.B: The community division that happens as a result of mistrust that isn't healthy

Anna: Have you had personally any situation where you had to stop mentioning this topic to friends or neighbours to avoid conflict or tensions?

M.B: Yeah. My husband [laughs] Yep, I think there are a couple of times that I thought "don't go there" unless you want to have messed up stuff. You pick your battles.

Anthropologist Anthony Cohen analyzes the concepts of belonging and community. Cohen considers the island community of Whalsay Shetland, delineating how the profound sense of collectivity "is expressed in the allocation of identity to individuals and their intracommunal groups—kin, neighbors and crew-mates" (Cohen 1982:19). He describes belonging as implying:

> very much more than merely having been born in the place. It suggests that one is an integral piece of the marvelously complicated fabric that constitutes the community; that one is a recipient of its proudly distinctive and consciously reserved culture—a repository of its traditions and values, a performer of its hallowed skills, an expert in its idioms and idiosyncrasies (Cohen 1982: 21).

In identifying oneself as belonging to a place, Cohen argues that this process is first done through the immediate kinship and neighboring group links with the community as a whole. Through these links, shared tradition and folk history mark the present time. Time and place become then part of a vocabulary needed to express one's attachments and associations, "a vocabulary which is so fluid that it can serve and mask the conflicting demands of the different sections to which they belong" (Cohen 1982:22).

When inhabitants of Whalsay speak of their community, they consider it to be an entity, a reality to which they have an attachment created through social relations and processes including friendship, neighbors, rivalry, kinship, and familiarity as well as being linked to consciousness. Cohen (1985:12) states "this consciousness of community is, then encapsulated in the perception of its boundaries, boundaries which are themselves largely constituted by people in interaction." When discussing the concept of community, Cohen considers this idea strictly linked to the symbolic construction of boundaries. Through a boundary one is able to express a distinction between what is different or similar to oneself. The marking of a beginning and end of a community "encapsulates the identity of the community [itself] and, as the identity of an individual, is called into being by the exigencies of social interaction. Boundaries are marked because communities interact in some way or other with entities from which they are or wish to be, distinguished" (Cohen 1985:12).

According to Cohen, when faced with a threat that could cause changes to the fabric of their community, members react to protect their own identities created as "individuals through their occupancy of the community's social space: if outsiders trespass in that space, then its occupants' own sense of self is felt to be debased and defaced" (Cohen 1985: 109). This sense of self is weakened when the structural and physical boundaries that previously separated a community from the rest of the world are blurred. For many community members, change corresponds to loss, often described as a fear of losing a "way of life" (Cohen 1985:109), but which in reality implies a fear of losing part of the self.

Several interviewees reported a lack of unity in the community, and emotional distress and anger never experienced before often prevailed as fracking increased and boundaries were threatened. G.K. recalled her experience of facing the presence of oil and gas companies around her house. Companies insisted on gaining consent to drill not too far from her farm, and repeatedly came back to their house, resulting in feelings of uncertainty and anxiety for her and her husband. In addition, there was a fear of the unknown of what might happen to their family property:

Anna: Some of the impacts you had were the noise, vibrations …have you ever experienced any feeling of anxiety?
G.K: Definitely. We had drillings and you know …I never felt that way ever. It was just so exhausting their presence.
Anna: Do you ever think If you didn't give consent…
G.K.: We hold off for a long time. But they kept coming back to us, coming back to us. Yeah and then they just said look…"we would be in and out with a couple of trucks". We believed them. Because we didn't know what was going on. We signed to get them off our back. *And that was the start of it.*
Anna: Have you experienced feelings of being scared for your health as well?
G.K.: Oh yeah totally. We had six acres, undeveloped land and I was outside planting. I used to do that before moving there too. You know the flaring and …I couldn't even handle the noise outside. I didn't want to be outside or there.
Anna: Have you had the fear of what could happen.
G.K.: Yes, the unknown.
Anna: And they will never let you know of what could happen
G.K: No, and people would say it is fine. But it is not 100 percent guaranteed. They could do safety procedures but everybody makes mistakes. So. You are not going to be 100 percent safe.

G.K said these experiences led to a complete shift in her sense of place and distancing herself as a strategy to feel less emotionally involved in the degradation that she sees happening around her:

G.K.: I have always lived in the country. Now I live in suburbia because I don't want to be in the country anymore as I was frightened another wellsite could pop beside me. So. That is my change I suppose. I love the country. But I am too scared to live there.
Anna: You feel more detached from all of it?
G.K.: I tried to I suppose. Things like these bring things up again. You try to sort of move on I suppose because it wasn't a very nice part of our lives. I don't want to keep going through that all the time. It is not healthy. I just don't think about it. I still am conscious of that and think about those living next to a rig and I used to see a TAGOil vehicle and feel angry. Hatred. I never felt that way before.

Similar feelings were shared by another community member who felt betrayed by experts and regulators whom he at first trusted:

Anna: Do you think it created deep social tensions?

I: Oh …I was ready to rip someone's head off. I blame the council. The council said "nah it wasn't us". Ehm…Yeah. There was. After that incident and we started ask questions to the council and council said we could do it because they would get away with it. I was willing …if I had the nerve, the councillors are naive, ignorant. But look at the report the management gave them …good good. Sign it off. Without any question. And that made me angry. /…/ People said we were naive we should have known better. But other people too should have known better and it happened to other people the same thing that happened to us. We believed that the council were mighty people and that pissed me off.

Others stressed that the small size of the region has accentuated these conflicts between community members. However, many of those who have to deal with wellsites so close to their property still want to take advantage of the benefits of oil and gas and if so, that sacrifice seems required to them:

I: In our communities there are certain areas like Tikorangi where there has been a lot more activity and it has created tension with some of the people living there. It is certainly, it is a small region. But the oil and gas companies, most of them go out and talk and consult and do everything they can and they try to talk and answer a lot of questions. /…/everyone wants to go to heaven but nobody wants to die. You know what I mean? Everyone wants to use the benefits of oil and gas their appliances and be able to go home and turn on the gas stove and use the benefits of it. But people don't want to live in the farm where the drilling …it has to come from somewhere …it can't be conveniently out there, but maybe in other countries. And we service all over New Zealand. People want to use and benefit from it and it has to come from somewhere which it happens to be in certain areas where oil and gas people are.

To my question if the persistent changes in the environment and the steady presence of the oil and gas industry through the years have brought a desensitization toward their surroundings, I often received mixed reactions from those who expressed a favorable view of the petrochemical industry in the region and from those who had a more negative perspective toward it. By desensitization, I mean a loss of emotional responsiveness to the negative aspects linked to the impacts brought by the industry. I argue that this level of desensitization can shape one's opinions toward extractive practices like hydraulic fracturing, as well as one's sense of place and perceptions of belonging. "I don't feel like I am desensitized," Margaret said. "I feel I have to ignore it and not focus on it. Because it made me angry all the time."

Some interviewees acknowledged the possible desensitization due to the long presence of the oil and gas industry in the region. Some interviewees linked it back to an idea of misinformation and the lack of transparency from the oil and gas industry, often revolving around money for either buying off the land or as retribution given as part of accessing one's private property:

Anna: Would you say that those who agreed for the companies to operate on their land were desensitized? Or…?

I: I would say that the industry has been around for a long time. Until it becomes next to you or becomes personal it is just another industry. Ehm… If you compare it to the dairy industry which is a huge environmental impact, change the ecology and the environment, so why the oil and gas companies are believed not to have it? The dairy industry is more transparent. You can look at a farm, see the effects on what people are doing, and you don't have to be an expert. The oil and gas industry is shadowed by misinformation. Not transparent. You can't get a straight answer. They would say "if we can't come to your place, we'll go to your neighbours and you'll feel the effects anyway". So people…if it arrived on someone property and they allowed it, they will… I wouldn't say be paid off… but they weren't fully informed either. Ehm. And they will be taken by the benefits of the industry by caring to look at the downside of it. Or ask those questions"

Anna: Do you think other people that accept the proximity of the industry to houses is it because they are desensitized to it?

I: Simple reason. One of our neighbour she was across from us, further across. She wouldn't know of the massive, drastic changes in traffic that happened on a country road. She couldn't know about that. But she was on the hall committee and the company helped support the hall and helped with money to paint the hall so. You know. They do good. Or they try to do good to keep the people in the neighbourhood closer. And that works. As I said we would have been the next closer. So there was another couple to our other sides from us and they supported as much as they could, but they gave up because it is finances. There is a lot of money involved. It is endless. If we were going to create the money problem. They told our lawyer they told us they would break us and bury us, pretty much. Financially. Those threats were given to our lawyer from their lawyers. How do you compete to that. You can't.

Anna: Yeah, because it is a big company

I: Exactly and that's how they get to people. They might mitigate them with money, compensation, just to keep them sweet. You know.

In their work, "Empires of Grass: Towards an Environmental History of New Zealand Agriculture," Eric Pawson and Tom Brooking (2008) describe how farming and dairying have been intensively shaping new landscapes since the late 19th century. Pawson and Brooking (2008) discuss how this transformation was aimed at promoting economic and social growth in

the country, based on the idea of improvement. This transformation forms a process they call "grassland totalitarianism" (Pawson and Brooking 2008:96), which replaced indigenous vegetation with pastures and crops. Since the late 1930s, environmental effects have been reported including soil loss and flooding, impacting water quality and water resources (Pawson and Brooking 2008:105). In the 1980s, the environmental reports of the Waitangi Tribunal drew attention to the damages to waterways and water bodies caused by agricultural and industrial development over the years (Wheen and Ruru 2004).

Kyleisha J. Foote, Michael K. Joy, and Russell G. Death (2015) critically analyze the impacts that dairy farming creates in the New Zealand landscape, as it continues to dramatically intensify and expand. They report that the quantification of the environmental impacts of dairying is a challenging process. The only comprehensive economic analysis of dairy impacts in the country is Tait and Cullen's (2006) report on external costs of dairy farming in Canterbury. Foote et al. (2015) state that "[t]he dairy industry does not pay for all its environmental pollution and the growth of dairy farming has occurred with little balanced economic evaluation or even awareness of the true environmental impacts and costs" (Foote et al. 2015:710). Some of the impacts from the industry are the loss of soil nutrients, changes in soil compaction, declining water quality, and an increase of greenhouse emissions. With the intensification of dairy farming, more nutrients must be added to the soil through fertilizers, compensating for soil and nutrient losses (Beukes et al 2012). The type and amount of added fertilizer will depend on the crop species. Since the 1980s, "the main nitrogen fertilizer used in New Zealand is urea" (Foote et al. 2015:710) mainly produced at Kapuni in South Taranaki, owned by Ballance Agri-Nutrients.

In 2018, Greenpeace NZ petitioned for a stoppage of urea production and use, stressing the serious impacts it brings to the plants as well as aquifers and rivers. John Bremner and Michael Krogmeier (1988:4601) report in their study that the increased use of urea can have "adverse effects on seed germination, seedling growth, and early plant growth in soil." Urea has also been linked to contributing to the eutrophication[37] of inland and coastal waters (Finlay et al., 2010; Gilbert et al., 2014), as well as a rise in reports of harmful cyanobacteria in high fertilization areas (Glibert et al., 2014; Paerl and Otten). Compared to other agricultural practices, dairying has been linked to a larger decline in water quality (Davies-Colley and Nagels 2002).

[37] Eutrophication is the increase of nutrient concentration in a water body, causing a dense growth of plant life and death of animal life due to a lack of oxygen.

Waterway pollution caused by dairy farming is mainly caused by nitrate ($NO_3$)[38]. In addition, animal fecal matter in water has been linked to human health issues. Andrew Ball(2006:iii) reports that in New Zealand "estimates of the burden of endemic drinking waterborne gastro-intestinal disease are of the order of ca. 18,000 and 34,000 cases per annum. [However,] preliminary results from work in progress suggest that these are underestimates."

As of today, there is a lack of a "holistic conversation in New Zealand of whether the dairy industry is actually beneficial for the country: economically, environmentally, and socially[...]. If the dairy industry is to continue to expand and intensify, accurate reporting of the real costs needs to be used in the evaluation of the true value of this industry" (Foote et al. 2015:717).

In my interviews, some people expressed their wish to see many of the oil and gas companies no more in the area, fearing how much closer and closer they are getting to farms and houses:

I: It will be nice if they weren't there. But probably overall we have been desensitized. We have been around here for so many years to various degrees. The thing we are against more is that they are getting closer to towns. I mean. The farmers involved don't want to have it. They are getting closer to town. Seems so ludicrous, doesn't it? Does not matter where it is.

Anna: You wouldn't say that you were desensitized by the industry?

I: I don't think so. [long pause] I suppose when I think about it, then yes. But in my mind, There is always a little concern on what it is doing to our environment. Once I got affected by it, I started to understand what was going on and how it was going on. And how much of it was going on. And I didn't want any of that around us.

Anna: Now that you moved away and you live in Inglewood you still have the same feelings you had when you were going through?

I: No no.

Along with perceiving that feeling of desensitization around them, others indicated their disbelief when first finding about fracking operations occurring in their community and expressed their concerns on how the country could be viewed internationally. In addition, there were concerns about how other natural resources were affected and what the future would be like if there was no immediate action to stop more onshore exploration.

I: When I first found out about. I couldn't believe it was happening. I used to say in the early days …they wouldn't be doing that. They couldn't possibly be doing that. We got

[38] The high level of nitrate depends on the amount of fertilizer applied, the stocking rate, and irrigation use.

an award for covenants. The Regional Council gave us an award. They had us over for lunch. They told us what a great job we were doing with helping bush regenerating and we had fencing keeping out of waterways, and so for a long time, all my life …when I was in year 7, in the 1970s, living around there all through my teenage years, heaps of my friends worked in the industry. Having no sense of being too close or too dangerous or all the rest of it. And thinking that the Regional Council had it under control. Of course, they would. I even worked for the regional council. A couple of summer holidays jobs. And I had no sense that they didn't. Until when I asked that question if they were fracking near my house …they said, the Council …they would get back to me …and they'd talk to the industry and they'd find out if they were fracking near the house. "Why don't you just go home, have a nice bath, a glass of wine and don't worry about it?" All my antennae were ALL alive. And then it just unraveled continuously from there over the next few years. And in the end, I audited all their environmental monitoring, visual visual visual …I don't think I found anything …general most of them had visual inspection and nothing else. / …/ All of their fumes and all their discharge, all sorts, all over their farm. And I thought "what a look is that for New Zealand?" Where Fonterra is sourcing the milk from that environment.

When addressing the same question of feelings of desensitization to experts and professionals working in the oil and gas sector, the majority acknowledged that the presence of the industry had been influential in forming the economic and social culture in the region. However, as A.P. (a general manager at Venture Taranaki) asserted, through the years people and the industry have attempted to be more conscious and environmentally responsible:

Anna: Because oil and gas is, I'd say … ingrained in this region. You think people perhaps are desensitized to the effects or you feel desensitized by it?

A.P.: I wouldn't call it desensitized… I guess you see it through the eyes through which you see it. And doesn't mean you see it like that all the time over time. I think it will be fair to say that overtime people in Taranaki got used to it even though we really ehm…. Understand and connect with the oil and gas industry because it is here, we are also conscious now on renewable energy and the shift to lower emissions. So ehm I think we have started to look at things in a greener light. Ehm and what they could mean for our province and the nation as well. And also, what we as a region can help as well. So, things change overtime, I think.

In my conversation with representatives at one of the major companies operating in Taranaki, an environmental manager engineer and the head of public relations, they brought up the analogy of 'drilling as farming' to emphasize that when done correctly, it represents just another way of utilizing land. They also mentioned that they have been engaging with communities to keep alive that strong connection with the land that community members share in the area with their values.

I1: There are different layers to it, it is quite a complex question /…/

You have the cultural layer, and I am probably not that qualified to answer to that one, on a functional level on terms of the landowners, a lot of those land owners are farmers like you have mentioned. So those farms have been in their families for generations. Their sense of their land is that it is their working environment. The land is here to provide resources, to look after, to provide money, it is a place where you work, there will be fences, you modify the landform to increase productivity of the land. So a lot of those farmers, you right … a lot of those farmers, the first well in Kapuni was drilled in 1959, so they have two-three generations growing up as farming families. The oil and gas industry are growing up alongside them, working alongside them, so they see a well flaring, a lot of farmers are excited "something good is here, the guy have a finding". It is a positive thing. That is in terms of a lot of landowner. But then there are people who… They buy land for different reasons, so for their lifestyle development … they have a different view, they have a different cultural view as well.

I2: I think … both these fields they are…fields in north Taranaki which is McKee Mangahewa and in south Taranaki is Kapuni. They have had activities since the late 60s. and I can't speak as being a part of those communities …but in the last five to six years I have been here, my response is probably more general to both land owners and the local hapu and iwi and … not from presenting their views … what I have experienced is that these operators have been around for so many years, people almost feel part of it.. and they feel almost a sense of ownership …whether it will be us building a wellsite, installing pipelines, or whatever, the cultural process that we have built around that and we engage with hapu and iwi, actually involves the amount of the decision making process as an example…be it around the route that we might attempt to avoid anything that is cultural significant, the process of *kaitiaki* or monitoring that occurs during the instruction phase, they can protect their land as much as …they may have views on our industry, they feel that we are listening to them that we are supporting, their views on this land, their vision on the community. And it is the same with the farmers, in Kapuni, analogies or stories, as relevant as the effect that these guys have lived with it for many years. For them, it is like farming, it is the same concept, it is just that someone in their community trying to have a productive existence, where you can actually you know…if things are done properly, they are done right, all these relationships and all these things can exist and become real assets for the region.

I1: And it all comes back to the perception of the environment and the values around them, so the farmers perception values are totally different from someone who moved to the city and retires and wants some peaceful quiet, so that is where some of the challenges arise, equals perceptions of the environment…

When I insisted on hearing their own view toward desensitization and the industry itself, the answer diverged to the necessity of living close to wellsites for them to fully experience a desensitization toward the industry, stressing how generally people in Taranaki are passionate about nature and the environment:

Anna: But what's your perception? Because I mean, I understand, the farmers, but you as individuals, and…you feel that…because I talked to people that they work in the industry, and I got some responses about their relation with the environment…and some

of them told me how they got used to…and other said that they don't feel desensitized or anything so I am trying to understand the perspective of the single individual…

I1: Whether we feel…

Anna: Yes.

I1: Well, to only answer that…you have to live within closer … from a view point of things, I have been environmental consultant for 10 years, working for Todd and other companies, because of the nature of the activity, and the direction of the communities, I don't think people are desensitized … toward the environment…The general people in Taranaki are very passionate about the environment…and we do live in a pretty cool place, I don't…but it will be hard to answer that on whether we feel desensitized from our environment because…I don't live in close proximity.

One of my interviewees expressed how being desensitized has become too often an excuse for so many to forget taking care of their land they live on:

I: I mean…You can't buy another planet. There is no planet B. This is it. And…We have got climate change… who knows what is going to happen in terms of climate change, to the waters of Aotearoa New Zealand. Who knows. Who knows the ferocity of storms we are going to get. Why would we take those risks? To me, it doesn't seem…It seems ridiculous.

Margaret tied this idea back to the loss of spiritual attachment to the land and the lack of responsibility that nowadays has unfortunately become a recurrent narrative:

M: Back to the risk and connecting that to my spiritual beliefs, I think there is a really hidden risk in our spiritual decline and how we are feeling connected to the land and caring about that. We all come to some indigenous belief that everything is connected, and we lost that somewhere along the way. And I think it is a spiritual detriment that we detached ourselves from our place. That we feel we don't belong or have a responsibility to it at all. That we even care about it. I think that damages us spiritually and mentally.

Basso (1996) discusses the spiritual aspect in relation to the sense of place that Apaches in east-central Arizona have developed and how not forgetting that attachment can help strengthen values and manage natural resource strategies differently. By not including the voices of different actors there is potential to lose valid insights that could help implement effective ecological and environmental policies:

> Knowledge of places and their cultural significance its crucial … because it illustrates with numerous examples the mental conditions needed for wisdom as well as the practical advantages that wisdom confers on persons who possess it. (Basso 1996:73)

This knowledge is "[c]ontained in stories attributed to the 'ancestors' … knowledge of places thus embodies an unformalized model of [behaving] and an authoritative rationale for seeking to attain it" (Basso 1996:73). Such knowledge and responsibility toward places echoed as well in my conversations, as interviewees addressed to me a sense of responsibility and an ethical approach in safeguard their landscape for the next generations. The role of community should be considered and pushed forward by recognizing that the community's involvement in decisions related to resource management "will create incentives for them to become good stewards of resources" (Agrawal and Gibson 1999:633). A homogenized view of and portrayal of communities leads one to miss "narratives that [tend to] favor state control or privatization of resources and their management." (Agrawal and Gibson 1999:633) Although there is a tendency to see communities as homogenous (Agrawal and Gibson 1999), it is essential to understand the way in which they are heterogeneous to provide a better representation of all the voices within the community. Management of their environment can be made more effective if different levels of understanding and voices are included. One person may see something as relevant within a landscape and have an emotional attachment to it but another person may feel differently even if they inhabit the same 'biotic system' (as Aldo Leopold would say).

In *A Sand County Almanac*, Aldo Leopold (1966) describes the importance of developing a land ethic. Often "[t]he ordinary citizen today assumes that science knows what makes the community clock tick; the scientist is equally sure that he does not. He knows that the biotic mechanism is so complex that its workings may never be fully understood." (Leopold 1966:174)

The processes of environmental degradation can transform the relationship(s) that an individual or a group has with the surrounding place. A landscape can slowly (or rapidly) lose its main features or have those features changed. As I collected the experiences and stories of my interviewees, I gathered the sense of frustration for many whose livelihood had been affected by the construction of wellsites near their house or their farm. Some were forced to sell their property, others decided to stand their ground and fight to not have a wellsite so close to their house, while others had to re-invent their life and give up a place they called home. As Valerie Kuletz (1998) points out the process of deterritorialization and the consequences it brings on a social and economic level alter the individual's views toward their land. In her study, Kuletz applies the notion of deterritorialization in relation to energy extraction and the deterioration of the landscape within Native American reservations around the Yucca mountains in Nevada. The

process of deterritorialization, defined by Kuletz (1998:7) as "the loss of commitment by modern nation states … to particular lands or regions," carries a complexity of nuances and elements.

Throughout the 1940s and 1950s, this area was the site of nuclear testing and nuclear waste repositories, events that have undoubtedly brought a modification of the environment and the way people relate to it. A landscape went from being conceived of as the land of tribes such as the Shoshone (who have attributed sacred and spiritual meanings to rocks, mountains, and animals inhabiting their region), to a nuclear landscape where activities such as uranium mining brought devastating health effects to those living nearby. Every year the number of individuals diagnosed with cancer and leukaemia increases, along with the number of miscarriages due to the constant exposure to radiation and contaminated foods. These events have led to a drastic decline in health within and around the reservations and many have chosen to leave because it is a "doomed" place.

These impacts affect the way people bond with and see their landscape and place of origin and also damages their cultural traditions (Kuletz 1998). Deterritorialization can prevent many Native Americans from using practices that could guarantee their family's livelihoods. The ways members of the communities look at their land can be grasped through Mr. Lockwood's testimony: he describes how he recognizes himself as a member of the Laguna Tribe, as an American citizen, and as a veteran. Although he can understand the reasons behind certain government actions, he cannot stop seeing that his "land is laying there open like a sore wound. [It is forgotten that] my people believe in the land. We believe in our Indian ways. We believe in the heavens and the stars…" (Kuletz 1998: 3).

Robina, educator from the *Ngaa Rauru iwi*, shared the spiritual connection and importance she has with her land and how poorly managed decisions when extracting resources such as fossil fuels could create a deeper damage to her identity:

Robina: The land here where we are on, I was brought up 5 min down the road. On the land that has been in our family for 600 years. Taranaki has always been our *moanga* but we have hapu up north, *rohe*. Very close to our waterways, our forests, and that is us. We don't own them. They own us. We have a responsibility for that. Kaitiaki. And you have come across that term before. It is our job, not to exploit them to a level of pain. Taking from our forests, taking from our waterways, taking from our moana, and we have a close connection with the sea. Our father was an amazing fisherman, he was a forager, he was a collector, we never went hungry. We had all these things. We could live off the land. It is really important that we maintain a balance that doesn't put our resources at risk. That is what our responsibility is. We are stewards of our environment. As an iwi, we are serious about the environmental changes that are happening. We are serious about

> getting involved. Where the decisions are made that might put us at risk, we are serious about our voices being heard. About different forms. And we put a lot of time and energy into creating the relationship that would sustain the voices. We don't go in there with a big bat because relationships would become down to…we have met with real positivity. There are some people, individuals, not everybody, that find it difficult for our voices to emerge, and would rather keep and maintain the status quo but there are others who understand that we have a part to play.

These words resonate with the concept of *kaitiakitanga*, guardianship of the surrounding environment. Kaitiakitanga stands for stewardship, and it is an active rather than passive relationship (Marsden and Henare 1992; Roberts et al. 1995). It implies protection, care, and vigilance, reinforcing the idea of "inter-generational responsibility and obligation to protect and [enable] the use of mechanisms such as tapu and rahui" (Kamira 2002:22). Only those with mana whenua— those (i.e., the iwi or hapu) who belong to the land—can exercise kaitiakitanga (Marsden 2003; Harmsworth and Awatere 2013), The act of kaitiakitanga is considered more than a duty each person has towards its hapu or iwi's mana responsibility (status or integrity); rather it is intrinsically connected to one's hapu or iwi's mana. Kaitiaki are considered spiritual guardians, acting through the medium of tohunga or animal entities: their job is to mediate the complex network of relationships that exist in the natural world—of which humans are but one part (Marsden 2003; Harmsworth and Awatere 2013).

As tangata whenua of Aotearoa New Zealand, many Māori share a holistic vision of their environment and culture, and an ethic of responsibility that resonates with views held in many other indigenous communities around the world. the tangata whenua of Aotearoa New Zealand as many other indigenous communities around the world. In the following section, I will discuss some general principles that apply and that come from readings grounded in the teachings of iwi Te Arawa, Ngāti Tūwharetoa, Ngāti Raukawa Ngāti Porou, Autoūri, Te Rarawa, and Ngati Kurī, Te Tai Tokerau.[39] As Harmsworth and Awatere explain "Māori world view acknowledges a natural order to the universe, a balance or equilibrium, and that when part of this system shifts, the entire system is put out of balance" (2013: 274). Traditional Māori values and customs are all based on a mixture of cosmology, religion, and mythology, and their belief system is shared through stories related to the origins of the universe, but more importantly to the knowledge they have gathered of concepts and linkages created with their environment (Barlow 1993; Hudson et

[39] A disclaimer: This section would be more fully presented by any Maori writer; this is my way of telling back what it is I have learned, in accordance with the Maori scholars and philosophers quoted and referred to below.

al. 2007; Mead 2003). Harmsworth and Awatere (2013) report that the Māori ecological knowledge is transmitted through different means: from whakatauki (proverbs) to myths and rituals. All these different practices allow Māori to express their thoughts and values and advice of past generations to present and future ones.

To understand something of Māori perspectives and their relationships toward their landscapes and geography, it is important to consider the "series of ordered genealogical webs that go back hundreds of generations to the beginnings" (Harmsworth and Awatere 2013:274), referred to as *whakapapa*. Following this, interrelationships are recognized among all living things. As considered through whakapapa, the regard for the interdependence and emergent diversity of life offers Māori a means to grasp the meaning of the entire system, and not just separate parts of it (Harmsworth and Awatere 2013). Whakapapa, as geneaology, includes union and descent from Papatūānuku (the earth mother, as mentioned) and Ranginui (the sky father). There is no separation between humanity and the natural world as everyone is a descendant of Earth Mother, Papatūānuku. Through whakapapa, all living things are connected and in relation. As Henare states, humans do not own all the resources exploited, but like "animals, birds, fish and trees can harvest the bounty of Mother Earth's resources" so too, do humans who "have user rights," and belong to the earth. Māori people "do not see themselves as separate from nature, humanity, and the natural world" (Henare 2001:202). As Marsden points out, a Māori worldview "perceives the universe as a 'process,' compromised of a series of interconnected realms separated by aeons of time from which there eventually emerged the natural world" (Marsden 2003:31). Whakapapa encodes the connections to both the natural and the spiritual world, the way Māori may position themselves within the world and how they interact, understand, and protect and conserve it. Through whanaungatanga (the active expression of kinship) the concept of whakapapa is embraced, and emphasizes the need for any collective group, and any ecosystem, to keep those linkages alive, to support and help each other, human and nonhuman. This approach is reflected through the concept known as kaitiakitanga, meaning guardianship which includes care for the surrounding environment as often applied and evident in the way Māori kaitiaki, or guardians, see and use the landscape and resources that are considered the main inheritance they will leave to future generations.

By actively engaging with the concepts of kaitiakitanga, whakapapa, and mana

whenua, the maintenance of *mauri* (life force, essence) is established. Mauri is a vital principle, a spark that initially possessed the Primary Life Force, a concentration of life itself: "like the centre of an energy source … its purpose is to make it possible for everything to move and live in accordance with the conditions and limits of its existence" (Henare 2001:208). Mauri is seen as the internal energy that comes directly from ancestral lineages. Mauri is the binding force between the physical and spiritual worlds, permeating all living and non-living things. Everything from people, tribe, land, mountains, stones, fish, animals, birds, trees, rivers, oceans, thoughts, words, etc., has a mauri "that permits these same living things to exist within their realm and sphere" (Henare 2001:208). The traditional Māori worldview acknowledges the dynamism of the universe as a system built around both the living and the non-living. Mauri may be violated, abused, or diminished by being attacked or neglected. Harmsworth and Awatere (2013:276) describe how the "damage or contamination to the environment [signifies, therefore] damage to or loss of mauri."

Fiona, artist, photographer and environmental activist in one of the areas of the region where oil and gas production is more intense, raised this point in our conversation as she reflected on her connection to her land. Having always lived and interacted with friends who had a Māori background, she found it easier to create a connection with the landscape. In particular, she feels a connection to the mountain that dominates the area where she lives.

Fiona: There is a whole group of non-Māori who have never felt that. To me I have always been connected to the mountain and growing up with people like Gina and her mom and lots of people understand it. But if you don't have that connection or demographic but they don't feel that. Even in the art conversation, with the idea of displacement it is when they assume lots of people aren't displaced at all, because of who they are, their heritage. Especially Polynesian background. On an Island. That is why I like living here. I have that connection with the mountain. I visit other places. But this is my home. And that is why I continue to record it as well. Cause I feel quite strongly about it. And for me she is female because of that lineage of people who taught me that. And that's that tribal group I connect to. Displacement is an interesting idea. But you got to see that we are an Island in the Pacific with a very strong Polynesian background. And people are not displaced here. To talk that conversation you exclude as well. They don't know what it means to me.

Fiona describes a feeling of a force or mauri through her connection to the mountain. She considers herself an activist and artist and explained that place has been the cornerstone in her work. Living on her dairy farm, she learned to repurpose and create a living space that reinforced her connection to the land even more:

Fiona: It's …is reinforced it coming here. I always interested in occupying a space as an artist and being a political, sort of activist artist. The sense of place for me is incredibly strong. Ehm. I was born in Inglewood, right under the mountain. And…ehm that sense of identity. You wrote in your thing talking about he, but to me the Mountain is female. So, there are two ideas of gender about the Mountain and the story. So, people here, when I worked in the late 70s with the older people at their marae, they called it her, that was their genealogy. That idea of something as an entity. It is fascinating. And I photographed that. Then I ran a web camera on the mountain. I set it up in 19 …2007. It is a live feed from the mountain. It is the same camera, since 2007 records each day and you can download time lapses. It is a passive view of the mountain. I got this idea that being here is a passive approach. But certainly, ehm …that is my approach. I recorded the landscape here for that long and the changes too. Living among the oil industry is particularly gross. They are gross people. What they do. They are like the early American film industry. They go and they take what they need. Pack up and go. And what is producing is meant to be wonderful and beautiful. It is no different from the oil industry.

Fiona described the mountain as bringing a sense of peace and unity to the area that was in from a community so fragmented due to the polarization of opinions toward the industry:

Fiona: The mountain is sort of a pacifier. Extraordinary to live here such as an entity like the mountain. I set up the camera as it is passive. It makes you think about colonization. It makes you think about the passage of time. You can watch online. The clouds, birds, and rainbows. The balance. Making sure that people understand it. I live with a lot of disruption. One day it will be different.

She has adopted a combative attitude, yet is optimistic of future changes and wishing that the industry will cease to exist sooner:

Anna: When you say you will outlive them

Fiona: They will pick up and go. It is in its heyday. I remember them coming. I'll remember them going. I remember Motunui being built. I went to the first hearing. That first day. That's it. They will go. I know it. It is intuitive. The history here is intuitive. That sense of them and the community. They will go. And it will end. They will end all the sponsorship. No more money. It will change drastically within the next 5 years. Burning fossil fuels and fracking. They don't see that. They talk about transition. But like you said in your work when the word sustainable came …climate change wasn't talked about in the 80s. We have the word climate change in recent vocabulary. With $CO^2$ emissions. We talked about $CO_2$ in 1980 and how it will change the grass with the flaring, the farming nature and they didn't know and they probably still don't know. I watched the transition. For me it's just natural. They will go. You can't have that treadmill. You can't have that practice without consequences. And photographic history is interesting as it is a lot about what it is about. Recording those times. It has become historical. I am always working in an historical context. It is still historical. That is the way time goes. And that is why I like time in the mountains. I can date time and every time lapse is dated with a time. And that is part of how I think.

Other local artists also stressed the influence of the mountain in their artistic work and daily life. As Marianne tells me, she has been painting Taranaki Mounga landscapes for a great part of her life and this process has shaped the way she interacts with the surrounding environment:

> I paint the mountain pretty much continuously and I have got paintings upstairs of the mountain …I would paint …trees, clean environment and the rivers. That's very important. I couldn't live in the city anymore. I feel quite differently about the mountain …I grew up with it. We built the house here because of that mountain. Having that view.

The mountain seems to have created a unity among community members with different views and perspectives toward the petrochemical industry. M.R, a shareholder and supporter of several oil and gas companies, described his sense of attachment to Taranaki Mounga and how he missed it when traveling:

M.R.: It is quite a funny thing. I was born here. I was born in Hawera. Ehm. I actually have a brother. A twin brother. and twin sisters. And something that we.. one thing is that I do notice you are always drawn to that mountain. You go anywhere, especially overseas… and the first thing you want to see it is that mountain. Yeah. And. For me. I have been lucky enough to ski on it. Yeah. Ski up there, walk …not beginner stuff. Ehm. It is a recreational side of things there, same with the trout fishing. All comes from the mountain

Others have learned to appreciate this attachment through the years, underlining the importance this geographical landscape plays not just on the physical environment but in family history and memories:

I: I consider that I have quite a strong connection to the landscape. So one of the interesting things here is that …you can't see the mountain here because of those big trees over there. But we are by the Patea River. So the river is just there. And what I learned since living here. We have been here for about 10 years now. It is that …when I lived in Hawera, I had a perfect view of the mountain. So everyday you would look at the mountain to work out what was going to happen with the weather ehm …you know life in the universe and everything. Whereas here, I have learned that the river tells you much the same stuff. Because it sourced off the mountain and so close to the mountain you can tell what it is going on by watching what is happening in the river. I can tell you at the moment there is no snow on the mountain because of the level of the river. And in the spring when the snow starts to melt you can see it because the water starts to run milky. So it is really interesting. Sometimes it can be in flood but still run clear other times it can be seriously in flood and… plus …that is my father standing on the mountain [pointing at the picture]. We spent a lot of time on the mountain growing up. He spent a lot of time on the mountain when he was growing up. Ehm and he probably rode his bike from Hawera to Dawson falls before he climbed to the summit when that picture was taken. Which it means he would have to descend again, hop on his bike and

> ride again home. And part of why I live here it is because I want to be self-sufficient as I possibly can. Don't use a lot of spray and terms like that. Pretty proud of our region for the efforts people have made not to try to stuff it up chemically or any other way. /…/ I think …it is really interesting that while we all claim to have a strong connection with the mountain there is not a lot of us that spends a lot of time up there. Whenever I go up there, I say to myself "Why you don't come here more often?".

This way of reading the landscape and its features echoes with what Stuart Kirsch (2000) described in his work with the Yonggom people in Papua New Guinea. For the Yonggom, "local histories were mapped onto the landscape, with places metonymically representing experiences in a person's life. In the course of a lifetime, the Yonggom acquire detailed knowledge of their land" (Kirsch 2000:246). The Yonggom knowledge of the exact locations of useful trees, plants, and the accustomed areas of particular animals, is applied to their understanding how they can modify their landscape through their use and construction of trails and camping places, or through harvesting production. Kirsch describes how the establishment of the open-pit copper mines, along the Ok Tedi river, have caused both a physical and emotional loss for the Yonggom. The land they once knew seems to have disappeared and with it their narratives and histories. Their relationship to the physical environment has changed in two fundamental ways: "[f]irst, they are haunted by a vision of 'environmental collapse' comparable to the biological concept of trophic cascade" (Kirsch 2000:259)—a concept absent in their way of thinking before mining began. Second, they are facing immediate problems from the mine including dead trees and the loss of animal varieties that brings them to question how the world can sustain them. Following this experience, they developed terminology such as the word moraron, meaning "corrupted or corroded, like a piece of wood that has decayed or food that has become rotten to describe the forests and rivers affected by the mine" (Kirsch 2000:259). In many cases, these processes can lead to a deterritorialization of an area such that it becomes almost, if not completely, a ruined landscape in the eyes of its caretakers as seen with the Yonggom (Kirsch 2000) and the Shoshone (Kuletz 1998).

In its common usage, the term 'ruin' defines desolate spaces or monumental structures left abandoned where vegetation freely grows, and deterioration is seen through cracks in walls and piles of rocks. Images such as the Cambodia's Angkor Wat, the Acropolis of Athens, or the Roman Colosseum, come easily to mind as "icons of romantic loss and longing that inspired the melancholic prose of generations of European poets and historians who devotedly chronicled pilgrimages to them" (Stoler 2013:9). But ruins are not strictly linked to these images. Ruins are

not just found, they are made and “become repositories of public knowledge and concentrations of public declaration” (Stoler 2013:20). Ruins are often what is left from the “aftershocks” of empires within countries once seen as colonies and basins for natural resources, regions used for intensive economic production (Stoler 2013).

The predominant narrative in a ruined landscape is characterized by a lingering socio-environmental discontent that can bring a “reconfiguration of differential powers to access control or attribute value to natural resources, typically limiting the reach of localized forms of governance and favoring more concentrated, less equitable arrangements” (Partridge 2017:764).Tristan Partridge (2017) refers to ruins when looking at the ecological struggles experienced in the central highlands of Cotopaxi, Ecuador and the changes that community members faced in relation to their connection with their land and its geographical features. Here the ongoing process of ruination—“an act perpetrated, a condition to which one is subject, and a cause of loss” (Stoler 2008:195)—is linked to the use of anti-hail cannons to prevent damage to crops and intensify crop production. In 2009, Hacienda Selva Alegre, a broccoli-for-export plantation run by agroindustrial operator Empresa Nintanga, started to use this technology. The anti-hail cannons operate via “a charge of acetylene gas [ignited] in their blast-chamber base and this explosion releases a pressure wave which is designed to disrupt that formation of hailstones in the atmosphere by creating a ‘cavitation’ effect” (Partridge 2017:766). After the cannon’s use, local farmers and Indigenous organizations began to experience prolonged periods of low rainfall and almost complete drought. This led to social mobilization through the coordination of organizations such as MICC (Indigenous and Campesino Movement of Cotopaxi), which demanded that plantations prove that they were not responsible for the environmental effects reported by community members.

According to Partridge (2017), the plantation owners in Cotopaxi are usually agricultural conglomerates or landowning families linked to the historical hacienda owners. The processes of ruination are “evidenced by the systemic, at times violent, erosion of resource sovereignties. Such erosion occurs through the dispossession of land and also as a result of the 'attritional' effects of political marginalization—for example from historical concessions that favor hacienda estates and limit access to water for many Alpamalag communities” (Partridge 2017:769). Decisions about land use, the structure of operating agencies, job availability, and what pesticides and fertilizers to use are limited to a handful of individuals, and profits “accrue outside communities

living in areas of production" (Partridge 2017:770). Social mobilization brought to the foreground the existing social inequalities experienced by affected individuals, highlighting a lack of sovereignty over their own resources. As Stoler (2013) states, imperial formations are not fixed things but are "processes of becoming" that are linked to the continual dynamics of extraction and destruction in Cotopaxi. These changes shaped the communities and the way their landscape is seen and experienced indifferent periods. Dispossession and domination are recurrent themes in regional histories, and local resource inequalities have shifted with different land uses, from dairy ranching to broccoli export, and intensive crop production.

Partridge's (2017) study echoes a story of extraction and ruination told by Teaiwa (2015). In her monograph, Teaiwa collects stories about Banaba, a miniscule island in the Republic of Kiribati located in the South Pacific, and how it came to be completely devastated. Formerly part of the British Gilbert and Ellice Island colony, Banaba was soon known for its abundance of phosphate resources. These resources "played a key role in the success of Australia's and New Zealand's agricultural industries" (Hattori 2016: 492), being an essential ingredient in fertilizer. Many mining companies began devastating and intensive extraction processes to obtain phosphate for trade. Tewaia (2015) describes the ecological and social struggles experienced by her fellow countrymen and through a reflexive process she expresses more than an "anticolonial rant against global, corporate, … greed" (Hattori 2016:493). Anna P. Hattori states that Tewaia "matches her deep digs into the historical archives with a … reflective care of collected oral testimonies, as well as a nuanced treatment of a variety of films, poems, songs, dances, photographs, and memoirs" (Hattori 2016: 492). Her story incorporates the political and corporate machinations that fueled the industrial mining project, the profit making behind it, the deep ecological destruction, as well as the cultural resilience and the ultimate oppressive dispossession of the people. She shines light on the processes of ruination provoked by persistent colonial forces and the mechanisms linked to them that eventually brought the complete displacement of the Banabans and the Indigenous Fijan Rabean splitting them between Australia, New Zealand, and Great Britain. Tewaia illustrates how this process reduced the Banabans' complex connection to their land to basic economics "where making money was the imperative, not "for the good of 'mankind' but [exclusively] for the profits of the investors" (Tewaia 2015:18). For Banabans living in commonalities from Wellington to Brisbane to London, home has been translated to the chemical equation:

$$3\ Ca_3\ (PO_4)_2 + 6\ H_2SO_4\ (aq)$$
$$6\ CaSO_4\ (aq) + 3\ Ca\ (H_2PO_4)_2\ (aq)$$

An equation that, as Tewaia (2015:33) points out, conveys the message of how "their land is now something other than an island" and how it is not just the people being deterritorialized but the territory itself that suffered from this phenomenon. Banabans and their land are both in a transformation caused by the mining's deep and fluid processes that shapes each individual's own sense of identity.

A process of ruination adds a sense of injustice to the destruction, abandonment, and dislocation of people, of communities, and of ways of life. I will discuss in the next chapter how injustice and the degradation of the landscape have brought different forms of activist efforts to the region of Taranaki, often as a way, I believe, to reclaim a sense of belonging and place that had been modified by the extraction occurring in the area. Reflecting on my movement through the small communities in the Taranaki region, ruination was visible through the infrastructure that occupies a landscape once characterized by grazing land and wild vegetation. The ruination is a symbol of an industrial colonization of the area often perpetrated by foreign companies. From my fieldwork diary entry:

> **Fieldnote (unedited), 1/3/2019:** Today I thought of taking advantage of the warm summer day. After stopping at Puke Ariki, I thought it would be a good opportunity to go for a walk once again around the Bell Block area. Before returning to Stratford. Two hours to walk there. Two hours to walk back. I got so used to walking everywhere now. I do remember the first time I visited here more than a year ago now. As I first landed, Urs picked me up from the airport and showed me around this "ugly area" as I recall he called it, before we joined the hikoi against seabed mining. Seeing Halliburton, Tasman Oil, Greymouth Petroleum, Schlumberger, their signs look quite unpleasant and invasive to the eye. Like a foreign object stuck on me. As I walked through the roads, it felt a different New Zealand. Strange New Zealand. Different from the downtown area here in New Plymouth and so different from Kay and Peter's house, some of whose neighbors across the street are sheep happily grazing. I wonder … how before the landscape was and what was there? And how would it look like once the industry ceases to exist? Would those buildings get repurposed? Become ruins of a company passage to this land and abandoned like the wells Sarah has mentioned to me? I wonder what others see when walking down those streets and if they think the same thoughts on how industrialized and globalized these streets look.

*Figure 20: Sheep grazing near residential houses*

# CHAPTER FIVE: REGULATIONS AND IRREGULARITIES: UNDERSTANDING THE OIL AND GAS INDUSTRY IN NEW ZEALAND

> **Fieldnote (edited), 11/2017:** "Let's stop here. I am quite sure they know my license plate or car model by now" chuckles Sarah toward me and C., as she slowly parks her vehicle near the entrance of one of the production stations in the area. We approach on foot, walking along the dusty road cutting through the fields. Like any other day in Aotearoa New Zealand, the long clouds are framing the sky above us and the vivid green grass seems to be the predominant color. Before one can go any further, the entry sign warns us with the bright color text of the restrictions, possible hazards, and corrosive substances found in the area. Not far from the entrance [Figure 21], Sarah points to a pool lined with a plastic tarp, full of water. To an unfamiliar eye, this would appear as collected rainwater, but the orange-brown particles floating in it and the smell of chemicals reveal another story. Sarah and C. explain to me in more detail, the risks of the contaminated water seeping into the ground, how in past decades the water had been dumped in ground pools with no lining to protect the soil. They speak of their concerns regarding what impacts and effects these practices could have brought to the land and animals that used to graze in the area. Looking at the picture I am about to take, I notice through the lens of my camera a metal structure in the background from which the operator in charge of monitoring the area is now standing and looking directly at us. Behind, as if closely keeping an eye on everything, Mt. Taranaki stands majestically among the clouds slowly moving to uncover its presence [Figure 22].

As we drove away from the well site, I couldn't get off my mind the contrast between the green open fields, the mountains, and the metallic structures of well sites, production stations, and oil rigs. The vignette above briefly illustrates some of the health and environmental concerns related to fracking operations that were visible to me and brought up by participants as I toured across Taranaki. The risks of possible contamination and irreversible environmental degradation were recurring topics that came up when discussing what worried local members of the region the most. Often, participants pointed to me how they perceived oil and gas companies to have the tendency to minimize the impacts that the chemicals injected during fracking operations might have on the public's health.

Sarah had expressed to me that companies often justify their approach by stating how the percentage of the fracking fluid to the water used is very minimal, or that "[t]he additives used … are largely those found in everyday household products including food" (Todd Energy 2012: 17), and are therefore to be considered harmless. Todd Energy itself reported that "[h]istorically

service companies have been reluctant to fully disclose the specific chemical compositions of many components used in hydraulic fracturing due to commercial confidentiality" (2012: 50).


*Figure 21: Entrance to Kaimiro "A" Production Station, Inglewood, Taranaki (NZ), 2017.*

*Figure 22: Foreground: Tailing ponds at Kaimiro "A" Production Station/Background: Mount Taranaki covered by clouds, 2017*

To better understand the contrasting ideas and views mentioned above, it is important to grasp how this unconventional extractive practice works and how fracking has developed throughout the years in the region and globally. As hydraulic fracturing is constantly being shaped by new technological developments, new uncertainties arise in relation to both environmental and social impacts that this practice can bring to communities. In this following chapter I will offer an overview of hydraulic fracturing and its history both globally and in the region of Taranaki, New Zealand. I will discuss the current regulations by which petrochemical companies must abide, the roles of local councils and companies in respecting these rules. With the shift of governments in recent times, regulations have changed, and new bills and laws have been approved in an effort to lead Taranaki on a low-carbon economic path and reduce the use of fossil fuel consumption in the country.

## The History of Hydraulic Fracturing as a Practice and How it Works

A contested and controversial technique (Cartwright 2013), hydraulic fracturing, or fracking combines the injection of "a mixture of water, proppants (silica sand/or manufactured granules) used to prop rock fractures open, and assorted chemicals deep into the ground at high pressure" (Willow and Wylie 2014:223) along with vertical and horizontal drilling.

The idea of fracturing rock to free up hydrocarbons, however, isn't really new; this process dates back almost to the beginning of the oil industry. As the American Oil and Gas Historical Society (AOGHS) reports, "in 1866, US Patent No. 59, 936 was issued to Civil War veteran Col. Edward Roberts, who developed an invention he titled 'Exploding Torpedo'" (2007: 8). The iron cylinder was filled with 20 pounds of gunpowder via a drilled borehole, and lowered into the ground until it reached the shale rock formation. The exploding torpedo was then activated through a detonator at the surface. By then filling the well bore with water, a practice described as 'fluid tamping', the impacts and deep fractures to the rock were drastically reduced (AOGHS 2007).

Inspired by this practice, a new idea, which would later shape the world energy trade and the current geopolitical landscape, started to slowly evolve. In the early 1930s, Floyd Farris of Stanolind Oil and Gas developed a pioneering project in the petrochemical industry. At that time,

liquid and later solidified nitroglycerine (NG) were used to stimulate shallow hard rock wells "from Pennsylvania to New York, from Kentucky to West Virginia" (Montgomery and Smith 2010: 27), making it an extremely hazardous, as well as an illegal, practice. Farris's project opted for a combination of non-explosive liquids, gelled gasoline, and sand. Performed in the Hugoton gas field in Grant County, Kansas, as Montgomery and Smith (2010: 27) report, his experiment consisted of injecting "more than a total of 1,000 gal of naphtenic-acid and palm oil (napalm), thickened gasoline, followed by a gel breaker, to stimulate a gas-producing limestone formation at 2,400 ft [below the surface]" (Montgomery and Smith 2010: 27). This first experimentation known as 'hydrafrac' represented a partial failure for Farris as it did not significantly increase production as expected. Nonetheless, it marked the beginning of hydraulic fracturing. A year later, Halliburton Oil Well Cementing (HowCo) was granted the exclusive use of the two commercial fracturing treatments (Montgomery and Smith 2010: 27). By the 1950s, hydraulic fracturing treatments reached more than 3,000 wells a month.

In the 1980s, a technological advance in fracturing shale formations led to an important change in oil and gas production. George P. Mitchell of Mitchell Energy & Development pioneered a combination of horizontal and vertical drilling, consisting of "guiding wells down a kilometre[and] then bending the well bore to extend horizontally another kilometre" (Heinberg 2014: 39). He discovered that if hydrofracturing was applied to naturally occurring cracks, it would result in the greater extraction of oil and gas reserves. Through this process, two main results were accomplished: first, more contact between the well bore and oil or gas bearing stratum was provided and secondly it gave the possibility for producers to drill horizontally beneath neighborhoods, schools, and airports [as was carried out in cases like that of the Barnett shale extraction project, where significant gas deposits lie beneath the City of Fort Worth]. Later on, Mitchell developed "slick-water" fracturing, which involved adding friction-reducing gels to water to increase the fluid flow in fractured wells. The widespread adoption of fracking technology caused the further exponential growth of natural gas production, resulting in a 25% increase in activity between 2007 and 2013 (Hausman and Kellog 2015).

While conventional oil or gas comes from geological formations that are relatively straightforward to develop, extraction of unconventional fossil fuels requires more complex technologies and stimulation techniques among which hydraulic fracturing or fracking is one Fracking allows cracks in the underground rock to release and bring up to the surface the oil and

gas trapped in them. Unconventional drilling methods are also used where increasing scarcity of oil and gas makes it difficult to retrieve these resources through conventional means. Through hydraulic fracturing, horizontal and vertical drilling are combined. This method allows oil and gas to flow from tight sands that usually could not be retrieved with conventional methods of drilling.

As outlined by Todd Energy NZ, there are three main reservoirs suitable for hydraulic fracturing:

> **Tight gas:** Wells produce from regional low-porosity sandstones and carbonate reservoirs. Many of these wells are chilled horizontally, and most are hydraulically fractured to enhance production
>
> **Coal and natural gas**: Wells produce from the coal seams which act as source and reservoir of natural gas
>
> **Shale gas**: Wells produce from low permeability shale formations that are also the source for the natural gas. Wells may be drilled either vertically or horizontally, and most are hydraulically fractured to stimulate production. Shale gas wells can be similar to other conventional and unconventional wells regarding depth, production rate, and drilling (Todd Energy 2012:10)

The fracking process is initiated by the drilling of a well that is lined with steel casing to ideally prevent any leakage into aquifers. The next step consists of perforating the steel casing. The holes, or perforations, create entry points for the fracking fluid to reach the targeted hydrocarbon zones. During the procedure, large amounts of hydraulic fracturing fluids are injected. The fluid typically consists of:

- 90-95% water
- 4.5-9.5% proppant materials (sand or ceramic beads)
- 0.5% chemicals

This composition varies from pure water to water mixed with solvents or gel and in some instances diesel oil (BTEX). As Todd Energy (2012) describes, typically between three and 12 additives are used. This depends on the conditions of the specific well and the surrounding rock formations. The following table includes the main components that can be generally found in the

fracking fluid [see Table 3]. When looking at the different types of fluids used, Reza Barati and Jenn-Tai Liang (2014) address the important role that water-based viscous polymeric fracturing fluids have been playing within the industry in recent years.

The main advantage given by water-based fluids is through the use of guar guam, a thickening agent, that under pressure creates a protective layer on the fractures, preventing in this way any leak-off of the fluids into the rock. Consequently, less fluid is needed. Nonetheless, the chance that these polymer-based fluids leak and invade high permeability formations is still relatively high and can cause "undesirable damage to the reservoir rock" as well as to water aquifers. In New Zealand, most fracking operations have used water-based gels, typically made up of more than 97% water. The Taranaki Regional Council reports how "[t]he typical percentage of additives in the fracking fluid is 2% with the water carried drawn from municipal supplies or consented river sources" (2013: 139). Tight sands and coal seams have required "between 100 and 350 cubic metres of fracking fluid per frack" (PCE 2012: 39). The largest multi-frack — meaning a well fracked multiple times— known to date in Taranaki used more than two thousand cubic metres of fluid, equivalent to about 70 full tankers.

After drilling through shallow freshwater aquifers, a pipe is immediately run through the hole and cemented into place. The process of constructing a well continues through the drilling of hole sections. Each hole section is encased by installing steel pipes. Good cementing techniques are critical to reach the desired hydraulic isolation between different zones and the well and the rock formations. This is done by cementing slurry down the inside of the casing and then back up the outside of the casing. Pressure tests are done to ensure hydraulic integrity. Before flowing the well or injecting fracture fluids into the well, the steel casing is perforated. Once the well is perforated, fracturing fluid with proppant is injected under high pressure into the reservoir creating fractures or fissures (Todd Energy 2012).

Fracking fluid components

| Component | Amount | Function |
|---|---|---|
| **Water** | approximately 98-99% of the total volume | Creates the fractures in the formation and carries a propping agent |
| **Hydrochloric acid (HCL)** | from 5% to 25 % in solution | Helps dissolving minerals and remove damage near the well bore by closing out cement around pipe perforations |
| **Corrosion inhibitor** | Approximately 0.2%-0.5 % | Used to control bacterial growth in the water injected into the well and prevent pipe corrosion |
| **Friction reducers** | 0.025% of total volume | Reduces pipe friction and pressure in the piping required to pump fluids |
| **Gelling agents (guar gum)** | Variable | Used to thicken. Helps in suspension and transport of proppants into formation |
| **Crosslinking agents (boric acids titanate and zirconium)** | Variable | Used to enhance abilities of the gelling agent to over further aid in transport of propping material |
| **Oxygen scavenger (ammonium bisulfate)** | Variable | to prevent corrosion of a pipe by oxygen |
| **Proppants (sand, resin coated sand, or man made particles)** | 1%-1.9% of total volume | Used to hold fissures open so gas and oil can be extracted |
| **Breaker solution** | Variable | Cause the enhanced gelling agent to break down into a simpler fluid so it can be removed from the wellbore causing back the sand/proppant material |
| **Sufractant** | Variable | used to promote flow of the fluids |
| **Scale inhibitor** | seldom used | used to control the precipitation of specific carbonated and/or sulphate minerals |
| **BTEX (benzene, toluene, ethylbenzene and xylene)- volatile organic compound** | Variable | used as an additive to increase efficiency in transporting proppants in the fluids |

Table 4: Fracking fluid components.

Adapted from: Holloway, M.D, and Rudd, O. 2013. *Fracking: The operations and environmental consequences of hydraulic fracturing.* John Wiley & Sons.

Although hydraulic fracturing has been commercially used for more than 60 years, with over one million oil and gas wells hydraulically fractured in the United States alone, this practice is seen as a new form of fossil fuel extraction. Its widespread use has brought different strategies to reduce costs associated with equipment while maximizing production and ways to reach resources more effectively. The last key technological component of modern fracking consists of a multi-well pad, or cluster drilling and involves the drilling of up to 16 wells from one industrial platform, along with the use of "Christmas trees," which are described as "[a]n assembly of valves, spools, pressure gauges and chokes fitted to the wellhead of a completed well to control production" (Schlumberger 2018). These technological components enable operators to concentrate machines and material in one place, reducing costs and accelerating well approvals at the same time (Todd Energy 2012).

Professionals working in the sector have described hydraulic fracturing as the opportunity for a more economically advantageous way of extracting fossil fuels, especially when considering the high costs and low benefits associated with other common methods of producing energy from them (Todd Energy 2012). Fracking also has made it possible to access cleaner forms of energy, like natural gas, which is described as a bridge between carbon-based sources and renewable energy forms (Pacala and Socolow 2004).

I will describe in detail the regulations applied in New Zealand and Taranaki region, by outlining how these have been updated and how the changes made have been implemented by companies and local councils, explaining the role as well that the government ultimately plays in putting them into effect. However, before discussing the current statutes and laws I will briefly offer an historical overview of the oil and gas industry in Taranaki, how the petrochemical industry has developed throughout the years, and how hydraulic fracturing came to be in the region.

## History of Oil and Gas in Taranaki, New Zealand

*Early discoveries in Taranaki.* New Zealand has a long history in the oil and gas industry dating back over 150 years. The first sites that oil drillers targeted were seepages, places where oil seeps out of the ground, occurring on the New Plymouth foreshore, at Kōtuku on the West Coast and north of Gisborne. As reported in *Te Ara- The Encyclopedia of New Zealand*:

> At New Plymouth, bubbles of gas were seen along the coast, and on calm days an oily sheen could be seen on the sea water. In early 1865, gunsmith Edward M. Smith collected samples of oil he found among boulders at Ngāmotu Beach, on the New Plymouth foreshore. He sent them to Britain for analysis. Following this, the Taranaki provincial government offered £400 for the discovery of a commercial find of petroleum. (Gregg and Walrond 2009: 4)

The discovery gave a start to the oil and gas exploration in the Taranaki region and later that same year, the first well was dug at Moturoa, on the New Plymouth foreshore, retrieving gas at 7 metres and oil at 20 metres. Other wells soon appeared, but only a few barrels of oil were recovered in the first years. By 1913, storage facilities were built to hold the crude oil collected as well as the first refinery. However, the local production was "spasmodic and could not sustain it. In the late 1920s, a second refinery was built by locals (it closed in 1975)" (Gregg and Walrond 2009: 4). In 1937, the government passed the Petroleum Act, encouraging overseas companies to look for oil and gas in the country. In the next decade, several explorations were carried out, mainly on North Island and the West Coast of the South Island. However, it wasn't until the 1950s and 1960s that the industry started to boom. Gregg and Walrond (2009: 4) recall the events that marked a turning point for the petrochemical industry in New Zealand:

> In 1954, the Todd Brothers company obtained government leases to explore large areas of the North Island, and it involved two overseas oil companies, Shell and BP, in the work. The first large-scale seismic surveys were carried out in Taranaki farmland, revealing a promising underground structure near Kāpuni. One Sunday morning in 1959, a drill rig at Kāpuni struck gas at a depth of 4,000 metres. The pressure was such that it forced the drilling mud back up the shaft, plastering the rig and workers with muck. Kāpuni was only a moderate-sized gas field by world standards, but it was large enough to meet the country's requirements for gas.

The onshore Kapuni field is now considered the oldest producing gas and condensate field in New Zealand. Kapuni gas led to the replacement of the gas produced from coal, and consequently to "the demise of gasworks throughout the country" (Gregg and Walrond 2009:4). In the area, a system of high-pressure pipelines and the construction of a treatment plant facilitated the distribution and maintenance of gas from Taranaki to Wellington and Auckland. The reticulated network and the intricate infrastructure paved the way for future discoveries. In 1969, the massive Maui gas-condensate field was discovered, becoming at the time the largest in the world and providing New Zealand with cheap and abundant gas for over 25 years. However, production did not commence until 1979, 10 years after discovery; the reasons for this delay "included the

technical complexities of developing the field, infrastructure design parameters that were beyond anything previously attempted" (MfE 2006:19). Indeed, when the Maui gas field was discovered, the development of offshore gas fields was novel on a world-wide basis and completely unknown in New Zealand.

*'Think Big' and the crisis of oil prices.* At the beginning of the 1970s, the world found itself at a pivotal point. The international economic system was hit by a profound crisis that shook its foundations, after an uninterrupted phase of development that lasted for about twenty years. The reversal of the economic cycle was determined by the oil crisis of 1973-1974 following which the economy had to deal with a sudden and sustained increase in the price of its main energy material: oil. In 1973, at the outbreak of the fourth Arab-Israeli war, the Arab countries part of OPEC, the Organization of Petroleum Exporting Countries, gradually started to reduce the production of crude oil. In a few months, world stocks dropped 10 percent while the price had doubled and quadrupled in a year (from 3 to 11.5 dollars). This increase led to the deterioration of the favourable terms of trade which had contributed to the post-war prosperity of developed countries (Bini et al. 2016). The economic question, intertwined with the political problem represented by the resurgence of the conflict between the Arab world and Israel, resolved the arm-wrestling that had opposed the producing countries to the cartel of western companies, which were until then the undefeated controller of the oil market. The surge in the price of crude oil in 1973-1974 was only the starting point of an increasing trend in the supply costs of 'black gold.' In this global scenario, the fluctuation of the oil prices was causing a strain for the New Zealand economy. Additionally, the country was facing a series of major problems: an insulated domestic economy was affecting possible external opportunities for growth; the rising of an increasingly sophisticated urban middle class, which was struggling to get access to good and services desired; a strong inflationary mode; a severe fiscal deficit due to the New Zealand government's spending much more than its available revenue; and an economic system unable to "tackle anything but the most urgent problems" (Easton 1997:12).

New Zealand's energy crisis was rather unusual and complicated to solve: as Easton (1997:11) delineates "[w]hile traditionally self-sufficient in electricity and coal, New Zealand had imported transport fuels" for decades, creating a dependency on oil from other countries. With the discovery of the Maui gas field, the energy supply was in surplus, as there were limited

industrial uses for gas in New Zealand (Easton 1997). At the same time, there was a growing surplus of hydro power in the South Island.

To tackle the energy issues, while attempting to create an energy independence, the National government created a strategy known as 'Think Big.' Think Big consisted of a series of projects aiming at intensively producing energy and distributing the gas surplus throughout the North Island. Interviewed on television by Dairne Shanahan in March 1984, Prime Minister Muldoon justified the projects "on the grounds that they would earn overseas funds" (Gustafson 2010:7), stimulating and diversifying New Zealand economy and "creating new primary processing industries" (Gustafson 2010:7). While from a technological point of view this strategy was seen as ambitious and innovative, Think Big became a rather controversial topic from a social and environmental standpoint. The risk of oil prices dropping again was barely taken into consideration, and the potential long-term impacts for an economy focused on funding energy related project and putting pressures on the market at a such delicate time were likewise barely considered. The constructed projects were several, among which were the ammonia-urea plant, the Motonui synthetic petrol plant, the Waitara methanol plant, and the Marsden Point (oil) Refinery expansion.

The oil and gas industry became even more of a common and daily reality during that time (the late 1970s). In conversation with my interviewees, memories of Think Big projects and the ephemeral optimism brought by new jobs and new economic horizons resurfaced. Many shared with me how it had became easier and more common for family members, relatives, and friends to be employed in the energy sector as Think Big projects were set up. As M.B. recounts details of his personal background to me, he tells me of the excitement the projects created within the community, leading him, like many others, to move from Europe to New Zealand:

> As in '84, Mobil developed this exciting gas to gasoline project, and I couldn't resist it and engineers from all around the world came to run it. Because it has never been done before. Like a normal process engineer, if you are lucky you get to start a new plant, but you mostly developing and modifying existing plants. But synth fuel is completely unique. We had to make our own as we want along. And it was a massive 2-billion-dollar-project, it was a lot at that time. So, because Shell discovered this big gas field offshore and New Zealand didn't have the market for it, they had to invent the market for it. So they imported this synthetic fuel project which is a marvellous project to convert methane basically to gasoline and then get methanol and from methanol is converted again and from it goes through gasoline. A completely unique process. And you know it made gasoline for cheap gas and also foreign exchange or what have you.

Nonetheless, not all the projects were as successful and long-term. The Motunui synthetic plant, the first and only one of its type in the world, was originally built to convert gas to synthetic petrol, and at the time of its conception it guaranteed a "significant shift from the situation in the early 1980s when New Zealand was 85 per cent dependent on foreign oil." As Engineering New Zealand (n.d.) reports:

> [t]he Synfuel plant played an essential part in supplying the New Zealand petroleum market, contributing directly to reducing New Zealand's vulnerability to uncertainty in imported crude oil supply. Operation of the plant represented the successful conclusion of a major engineering task and the demonstration of a first-of-a-kind application of zeolite catalyst technology. The project was also notable because it demonstrated the application of engineering design methods to reduce the environmental impact of noise.

The Motonui synthetic plant was closed in less than a decade and quickly re-purposed. A.T. recalls to me what led to the closure of the plant, while discussing major events of the Think Big strategy and the discovery of the Maui field:

> …the Maui field which was a serious gas discovery in the 1970s, late 60s. And at the time was the 4th largest gas field in the world. As the result of this finding, there was a lot of gas surplus. So the government had to figure out how to get it. Robert Muldoon, *infamous Prime Minister,* along with the Minister of Finances Bill Birch, they decided to institute a program they called *Think Big*. And this involved some major investments in the utilization of the Maui gas. Quite a few investments were here in Taranaki. At the time oil prices they were going up fast, it had triggered worldwide economic recession in the 1970. So, one of the major project was to construct a plant in North Taranaki which would convert gas into petrol. Gas to gasoline plant. Ehm... 2 billion dollars, in 1980s, equivalent to 11 billion now? Another project was ammonia urea in South Taranaki to convert natural gas to make urea as fertilizer. But the gas to gasoline plant was a really big one. It was commissioned in the 80s, 1986 I think. Just as the oil prices took a *big slump*. The thing was never really economic, And oil prices continued to drop and stay low for the rest of the 80s and the 90s…Part of the selloff of government assets in the 80s, the government sold off the plant…actually it was transferred to Fletcher Challenge Energy paid (inaudible)… Fletcher Energy to take it away. Fletcher Challenge flicked it to Methanex which is a Canadian company for 400 million dollars. Fletcher Challenge got 800 million dollar for nothing, thanks to taxpayers and Methanex got a 2 billion dollar plant for...400 million dollars. /…/ Now…Methanex *did not* have interest in continuing manufacturing petrol. And the first stage of petrol manufacturing was conversion of gas to methanol. And that's what Methanex was interested in. They shut down the part of the plant that made the petrol and produce only methanol. What they really wanted was the Maui gas. Because the gas contracts went along with the plants and they were the 40 percent of the output of the Maui field. And price was rock bottom. Incredibly cheap.

Although some benefits were gained by construction workers, particularly for the Motonui and New Zealand Steel projects, Think Big caused overall costs that would come to increase the financial instability that the country was experiencing. By 1984, 'Think Big' was positioned on a financial basis that simply didn't hold anymore. Think Big contributed to heightening the fundamental tension in economic policy leading to an exploitation of native resources and creating pressure for the export market. As Wylde (2016: n.d.) reports:

> No definitive study appears to be available as to whether there was a positive economic benefit to New Zealand from Think Big or whether it simply raised the country's debt levels. Undoubtedly economic activity was sustained during the construction period but the basic justification for the projects, a permanently higher oil price, did not eventuate. Oil prices subsequently dropped in real terms.

Former Labour Cabinet Minister Michael Bassett expressed in an interview how the strategy became an attempt by Prime Minister Muldoon and the National Party to assert itself as a revolutionizing leader for New Zealand, adding a political edge by saying they would revolutionize the economy:

> The world could read that we had spent an enormous amount of money that we were not going to get back and the run on the New Zealand dollar in 1984 was in large measure a result of 'Think Big' and the huge borrowing that we had done. (Hembry 2011:1)

As Easton (1997: 20) explains "[t]he outcome of the Think Big proposals was seen as a disaster, although the officials tended to explain the failure as an example of the Muldoon policies rather than an outcome of their policy advice framework." Think Big turned out to be a political gamble that left half-promises and half-solutions to the energy problem.

## Hydraulic Fracturing in Taranaki

The oil and gas industry continued to grow its presence in the region of Taranaki and to expand extraction activities through new techniques and innovative ways throughout the 1980s. 1989 was the year that revolutionized the petrochemical industry: Petrocorp carried out its first frack operations at Kaimiro-2 gas well in Taranaki, though there may have been earlier instances (Parliamentary Commissioner for the Environment 2012). The development and use of new technologies, such as acoustic imaging and deep rotary drilling, resulted in the discovery in 1959 of the large onshore Kapuni gas-condensate field in South Taranaki, followed by the discovery of the very large Maui gas-condensate field in 1969. Today there are 20 oil and gas fields in

operation, all based in Taranaki and, as of 2014, almost 6,700 billion cubic feet of natural gas and 450 million barrels of oil have been produced in New Zealand. New technology is now allowing operators to explore at greater depths and further from land. There have only been two unproductive attempts to frack for coal seam gas outside Taranaki: in Ohai in Southland, and in the Waikato region through Solid Energy's coal seam gas pilot between 1997 and 2001.

As reported by PEPANZ, the Petroleum Exploration and Production Association of New Zealand, fracking technology allowed exploration to occur in places it previously hadn't, such as in the Reinga and Pegasus Basins off the North Island, and in the Canterbury and Great South Basins off the east coast of the South Island. For its richness in oil and gas, Taranaki has been described as the "Texas of the South Pacific" (Loomis 2017). The region has been home to a series of oil and gas explorations that have brought a total of 100 fracking operations in 39 different wells operated by companies such as Greymouth Petroleum, Todd Energy Ltd, Origin Energy NZ Ltd, and Tag Oil (PCE 2014). As the Parliamentary Commissioner for the Environment reports indicate, New Zealand has an abundance of what is called 'tight' petroleum, or oil and gas held tightly in rock. Almost all the fracking used to gather these fossil fuels that has taken place in New Zealand has been carried out in the Taranaki basin. Crude oil produced in New Zealand is very high quality and fetches a high price on the international market, which is one of the reasons why almost all domestically produced crude is exported. To meet domestic demand for fuel, lower quality Arabian crude oil is imported into Northland's Marsden Point refinery. Right now, approximately 42 percent of all profit from any producing field is returned to the New Zealand Government in the form of royalties and income tax, and over the last decade New Zealand has received over $3 billion for its oil and gas resources (PEPANZ, n.d.: 10). Offshore oil and gas is the largest contributor to New Zealand's marine economy representing 48 percent of the marine economy in 2013 and contributing more to New Zealand's GDP than shipping, fisheries and aquaculture combined (PEPANZ, n.d.: 10).

In 2008, the National party led by John Key[40] brought significant changes in the oil and gas sector. As Terence Loomis explains in his book *Petroleum Development and Environmental Conflict in Aotearoa/New Zealand: Texas of the South Pacific,* with the National party victory, the previous Labour government's economic, environmental and local government policies …

[40] John Key was Prime Minister from 2008 to 2016. In 2014, the National party gained another victory. However, Key resigned suddenly in December 2016, and Bill English replaced him as a party leader and prime minister.

were considered barriers to business growth and natural resource exploitation" (2017: 71). Under the leadership of previous prime minister Helen Clark the Labour government had given emphasis to a "sustainable development approach to a national and local development" (Loomis 2017: 227) and undertook initiatives to empower communities. However, when the National government took office in 2008, a Business Growth Agenda was introduced to "accelerate commodity-led export growth and expand petroleum development" (Loomis 2017: 227). From the National Party's perspective, local government plans for sustainable development were impediments to the national interest, leading consequently to campaigns for legislative reform and oil and gas expansion. Under Jacinda Ardern's leadership, the Commissioner for the Environment called for an "inter-sectoral collaborative process to develop a plan for weaning the country off dependency on fossil fuels and addressing climate change" (Loomis 2017: 76). However, during three successive terms, the National government had marketed the importance of deep-sea and unconventional onshore prospecting. Through extensive use of official information channels, the government attempted to address the public's concerns about the health impacts and risks of hydraulic fracturing and the potential catastrophic effects of offshore oil spills (Loomis 2017). However, unlocking potential oil and gas resources and growing the economy has been a priority for the government's agenda over the last three decades. In 2011, while acting as Minister of Energy and Resources for the National Party, Hekia Parata stressed how the expansion of the oil and gas industry in New Zealand would provide energy security and provide export earnings: "[w]e cannot just turn off the tap in our journey to a lower carbon economy. As fuel costs continue to rise, a key challenge will be to reduce our reliance on petroleum while enabling New Zealanders to have access to competitively priced energy" [Ministry of Business, Innovation and Employment (MBIE) 2011-2021].

The public raised criticisms towards the National Party government as their agenda became apparent, bringing accusations that their approach neglected an examination of the severe environmental impacts and consequences of offshore oil operations, and as not taking into consideration a more sustainable approach to growth (Loomis 2017). In November 2009, under the National-led government, a Petroleum Action Plan was introduced to define eight core work areas projected to raise the value of petroleum exports from three billion NZ dollars in 2009 to 30 billion dollars by 2025. The Action Plan touted the importance of the petroleum sector and government support for exploration and development through stronger targeted communication

strategies. That same year, at the New Zealand Oil and Gas Outlook conference, former Minister of Energy Gerry Brownlee outlined their intention to "ensure that the country is regarded as having a favourable investment environment to attract major investments of global capital to support exploration activity" (Brownlee 2009:1).The plan was incorporated into the New Zealand Energy Strategy 2011-2021 plan, which aimed to make the most of the "country's abundant energy potential through the environmentally responsible development and efficient use of the country's diverse energy resources" (Loomis 2017:75). Government information (labeled as evidence-based information) is, as Loomis (2017:90) stresses, "distributed in a calculated manner to validate government's petroleum industry policies and programs, influence public perceptions … and counter the supposedly emotive, ill-informed and unscientific claims of critics."

The establishment of New Zealand Petroleum and Minerals (NZPaM) in 2011 aimed to strengthen the government's capabilities in marketing the country's oil and gas basins. In addition, NZPaM was intended to consult with local authorities and iwi about mining procedures and permits as well as provide information to landowners and communities (Loomis 2017:90). In 2013, NZPaM organized a series of roadshows to disseminate public information about oil and gas development. The roadshows occurred immediately after public controversy surrounding the release of a hydraulic fracturing interim report prepared by the Parliamentary Commissioner for the Environment (Loomis 2017). However, the NZPaM roadshows represented an "exercise in mis-information and citizen disempowerment" (Loomis 2017:94) dismissing the mounting evidence of adverse effects of unconventional deep-sea drilling and growing public concerns.[41]

*Regulations.* Oil and gas development in New Zealand is regulated by a series of separate agencies, each with different responsibilities and areas of expertise. The legislative framework regarding prospecting, exploration, and mining of minerals and hydrocarbons including petroleum, is set out by the Crown Minerals Act 1991 (CMA). Foley (2019:1) explains how "[t]he Continental Shelf Act applies the provisions of the Crown Minerals Act 1991 (NZ) in respect of regulating petroleum exploration and mining on the continental shelf (in addition to mining on dry land)". The CMA confirms that the Crown possesses all property rights in

[41] During my two phases of fieldwork, these concerns were highlighted and linked to feelings of uncertainty and distress. The oil and gas industry professionals that I interviewed have acknowledged a gap between industry knowledge and community knowledge in the region and the need for a bridge to properly disseminate information. I will explore these aspects later in this chapter when I discuss the narratives presented during interviews and participant observation. This discussion is to gain a clearer understanding of the concerns associated with the petrochemical industry and hydraulic fracturing operations.

hydrocarbons and natural gas. The Act provides for the issue of mineral programmes, which are policy statements directed at applicants. The Minister of Energy, as the decision-maker, considers applications for exploration and mining of Crown-owned minerals and prepares one or more programmes specific for the resource being developed. The purpose is to efficiently allocate the minerals and obtain a financial return or royalties for the Crown. While the Crown Minerals Act is strictly linked to the correct management of the minerals, the Resource Management Act 1991 (RMA) regulates the environmental impact and regulation of onshore mining activity. The Ministry for the Environment reports that "the RMA is based on the principle of sustainable management which involves considering effects of activities on the environment now and in the future when making resource management decisions" (Ministry for the Environment 2018: n.d). The following table delineates the responsibilities of central and local government agencies during the various stages of exploration and production of mineral resources (including oil and gas) and how these resources are managed:

| Step 1: Assessment (up to 4 years) | Step 2: Exploration (up to 15 years) | Step 3: Production (up to 40 years) | Step 4: Decommissioning |
|---|---|---|---|
| Prospecting permits: **NZP&M** | Exploration permits: **NZP&M** | Mining permits: **NZP&M** | Resource consent: **Regional and/or District Council** |
| Resource consent (Seismic surveying): **Regional and/or District Councils** | Resource consent (including seismic surveying): **Regional and or District Council** | Resource consent: **Regional and/or District Councils** | Safety case/notification: **Worksafe NZ** |
| Land access on public conservation land: **DOC** | Resource consent applications for nationally significant proposals: **EPA** | Resource consent applications for nationally significant proposals: **EPA** | Land access on public conservation land: **DOC** |
| | Safety case: **Worksafe NZE** | Safety case/notification: **WorkSafe NZ** | |
| | Hazardous substances: **EPA** | Land access on public conservation land: **DOC** | |
| | Land access on public conservation land: **DOC** | Hazardous substances: **EPA** | |
| | Land access on other Crown-owned land- **relevant Crown agency** | | |

*Table 5: Responsibilities of central and local government agencies.*

Adapted from: New Zealand Petroleum and Minerals (NZP&M). 2017a. "Who does what in New Zealand's onshore petroleum and minerals regulatory regime?"Retrieved from: https://www.nzpam.govt.nz/asset

As shown in the above table, specific steps are controlled by specific agencies through the different stages of the exploration and production process. The statute is administered by NZ Petroleum & Minerals (NZP&M), a branch of the Ministry of Business, Innovation & Employment. Multiple government agencies, along with regional and district councils "share the responsibility for regulating onshore petroleum and minerals activities" (NZP&M 2017a:2). The NZP&M's role is "to process and monitor prospecting exploration and mining permits" (NZP&M 2017a:4), by assessing an operator's technical and financial capability through a preliminary evaluation of "systems that are likely to be required to meet applicable health, safety, and environmental legislation" (NZP&M 2013:29). As reported on their website, "[i]n return for a permit, operators must pay fees and royalties" (NZP&M 2021) as well as provide the NZP&M with geoscience information, digital geospatial information, and drilling samples. Permits given to the permit holder do not give automatic right to access the permit area: for exploration and mining activities "permit holders must arrange land access with the landowner and occupier. For minimum impact activity, 10 days notice is required" (NZP&M 2017b:1). Onshore permits are no larger than 500 square kilometers and are granted for up to two years. An extension is allowed for up to half the permit area for an additional two years up to a total of four years from the permit release date. While mineral permits are categorized as Tier 1 or Tier 2 types, all petroleum permits are classified as Tier 1 "as they are complex, higher risk and return operations requiring a more proactive management and regulatory regime" (NZP&M 2017b:1) [See Appendix B].

Other involved agencies include WorkSafe, New Zealand's primary workplace health and safety regulator. WorkSafe's responsibilities are defined by the Health and Safety at Work Act 2015 and cover three key roles:

1. **Regulatory confidence:**
    a. Undertaking regulatory activity to provide confidence that New Zealand workplaces are properly managing health and safety;
    b. Enabling New Zealand to have confidence in WorkSafe as the primary health and safety regulator;
    c. Supporting confidence in the effectiveness of the health and safety regulatory regime.
2. **Harm prevention:**
    a. Targeting critical risks at all levels (sector and system-wide) using intelligence;
    b. Delivering targeted interventions to address harm drivers (including workforce capability, worker engagement and effective governance);

c. Influencing attitudes and behaviour to improve health and safety risk management.

3. **System Leadership:**
   a. Leading, influencing, and leveraging the health and safety system (including other regulators) to improve health and safety outcomes;
   b. Leading, influencing, and leveraging the health and safety system (including other regulators) to improve health and safety outcomes;
   c. Promoting and supporting industry, organisation, and worker leadership of health and safety;
   d. Leading by example through WorkSafe's own good practices. (WorkSafe 2020)

WorkSafe is led by a Chief Inspector with regional teams maintaining regulatory oversight of mining, petroleum, and geothermal operations. In regard to petroleum and mineral activities, "WorkSafe is responsible for the rules that ensure that the oil 'stays in the pipe' and the risk of well failure is a s low as reasonably practical" (NZP&M 2017a:4).

The Environmental Protection Authority (EPA) covers several functions in the operational steps of petroleum and mineral production. A crown Agent was established under the Environmental Protection Authority Act 2011, helping "the government to achieve its goal of growing [New Zealand's] economy, while effectively protecting [its] natural environment" (EPA 2021). The agency has three main roles related to petroleum activities:

1. Responsible for granting resource consents in projects involving key infrastructure (pipelines, etc.) under the RMA regulations;
2. Responsible for managing the effects of 'restricted' activities on the environment in the Exclusive Economic Zone area (between 12 and 200 nautical miles of the coast and New Zealand's continental shelf. Discharge of harmful substances and dumping waste is managed by the EEZ Act 2012;
3. The EPA considers applications for marine consents, monitors compliance and carries out enforcement actions. (Ministry for the Environment 2018)

Resource consent applications can be referred to the Environment Court or referred to a Board of Inquiry for assessment and decision if the proposal has national significance. In the latter case, the Minister for the Environment appoints an independent board, which has the job "to consider all submissions, hold a hearing, and make a final decision on the matter. The EPA provides administrative support services to all Boards of Inquiry" (EPA 2013:1). The Department

of Conservation (DOC) is a government agency responsible for conserving New Zealand's natural and historic heritage under the Conservation Act 1987, the Wildlife Act 1954, and the Marine Mammals Protection Act 1978. The DOC, acting as the landowner, must grant permission for activities on conservation land. When assessing grant access, there are various criteria followed including "safeguards against any potential adverse effects of carrying out the proposed programme of work" (NZP&M 2017a:5).

Under the Resource Management Act (RMA), Regional and District Councils have the responsibility to manage the effects of onshore development activities and the environment. While District or City Councils "focus on the environmental effects of land and use activities," Regional Councils "address air, water, the coast, pollution and discharges, and have jurisdiction in the coastal marine area (out to 12 nautical miles offshore)" (NZP&M 2017a:5).

The RMA has undergone critical revisions over the years. In 2015, the (National Party-led) government announced a reform initiative aimed at "rethinking the entire urban and environmental planning regime" (Loomis 2017:83). As Loomis (2017) explains, the government in 2015 tried to dismantle the RMA and legitimize changes through a Productivity Commission. In 2017, The Resource Legislation Amendment Act 2017 was enacted, bringing significant changes to the RMA, as well as to other legislation. These changes included modifications of various planning processes and "amendments that enable a more permissive regime for certain activities, create new limits for appeal rights (in certain circumstances), and alter notification processes, particularly in respect of consent applications for boundary and residential activities" (Auckland District Law Society 2017:1). The Resource Legislation Amendment Act contains close to 40 amendments and makes significant changes to five different Acts (including the RMA) and as a result amends several others. Goals include a stronger national direction, a more responsive planning process, a streamlined resource consent process and better alignment with other legislation. The Ministry for the Environment (MFE)(2017a: 1) states:

> This is the most comprehensive package of reforms to the RMA since its inception 26 years ago. These changes aim to deliver substantive improvements to the resource management system to support more effective environmental management and drive capacity for development and economic growth.

The first set of amendments, which included changes to various planning processes, came into force on 18 April 2017. The second set came into force on 18 October of the same year. These

include amendments that enable "a more permissive regime for certain activities, create new limits for appeal rights (in certain circumstances), and alter notification processes, particularly in respect of consent applications for boundary and residential activities" (Auckland District Law Society (2017:1). In 2013, a discussion document, *Improving Our Resource Management System,* outlined the problems and proposals of resource management reform. The discussion document along with past submissions and government proposals underlined how the problems frequently manifest themselves in resource management processes. Three overarching problems contribute to a series of inefficiencies and inequalities within the system:

1. A lack of alignment and integration of policies and processes across the system;
2. Resource management processes and practices are not proportional or adaptable;
3. The system makes robust and durable decision-making difficult. (Environmental Defence Society 2016)

Many parties engage with the resource management system only at the point of applying for resource consent. This system often leads to inconsistencies, complexities, and uncertainties that eventually increase time and cost for system users: "[l]ong-winded appeals, objections, and litigation reduce certainty for resource users, undermine the planning process and contribute to risk-averse decision making" (NZPI 2017:1).

Changes to the RMA include a different approach toward Māori participation in decision making. As explained in a series of fact sheets prepared by the Ministry for the Environment, previous engagement between councils and Māori in RMA planning and consenting has not been consistent across the country. While the RMA has had some successes in Tangata whenua participation, these "previous efforts to engage Tangata whenua in environmental management have not achieved the anticipated outcomes" (MFE 2018:10). In 2011, the Waitangi Tribunal underlined the need for a reform process and how the RMA gave hope for Māori to gain proactive roles in environmental decision-making (Ko Aotearoa Tenei, Wai 262, 2011). The RMA's principles and purpose "gave legal recognition to Māori interests in ancestral land, water, and other resources, and required local authorities and others with powers to "have particular regard to both the Treaty and the concept of kaitiakitanga" (MFE 2018:13). Despite the mechanisms and regulations contained in the Act that seemed to give more power to iwi authorities, the legislation delivered less than what was promised for Māori participation in decision-making processes.

The effectiveness of existing relationships between iwi and councils is difficult and varies. The Ministry for the Environment stressed how "in some regions, councils and iwi have informal arrangements, memoranda of understanding, statutory joint management arrangements, Treaty of Waitangi settlement arrangements, or advisory boards to the council" (MFE 2017b:1). In many of the regions, however, Māori have had limited possibilities and opportunities to establish effective engagement with the Resource Management Act. A lack of a valid and effective national statutory requirement for councils to engage with iwi can affect working relationships and bring disagreements and delays in the planning process. Confusion on what to expect and require of the different stakeholders has created frustration among tangata whenua and local authorities, straining their relationships. Through the amendments, the Ministry for the Environment aimed to:

- enhance opportunities for iwi input to the RMA plan making processes;
- introduce a new process for establishing agreements between Tangata whenua (through iwi authorities) and councils, called Mana Whakahono a Rohe: Iwi participation agreements (Mana Whakahono a Rohe)(MFE 2017b)

A Mana Whakahono is a binding statutory arrangement that provides for a more structured relationship under the RMA between:

- an iwi authority and a local authority/local authorities
- a combination of iwi authorities and a local authority/local authorities
- a combination of an iwi authority/iwi authorities and hapū, and local authority or local authorities or a hapū and local authority (if initiated by the local authority)
- a combination of hapū and local authorities (if initiated by the local authorities)" (MFE 2018:10)

Through this process working relationships are improved and formal relationships can be developed. Tangata whenua expectations of implementing their kaitiaki responsibilities under the RMA have not always been supported, despite a constant attempt for iwi involvement in the RMA. However, through the Ministry for the Environment (MFE) Mana Whakahono ā Rohe guidance, exercising kaitiaki responsibility can be done in a variety of ways including commenting on new proposed plans, the consultation on specific resource consent applications, and freshwater monitoring. The following figure illustrates how the process of Mana Whakahono might work and how it would ideally guarantee opportunities for strengthening relationships between Māori and local authorities and engage iwi and hapū in policy-making processes.

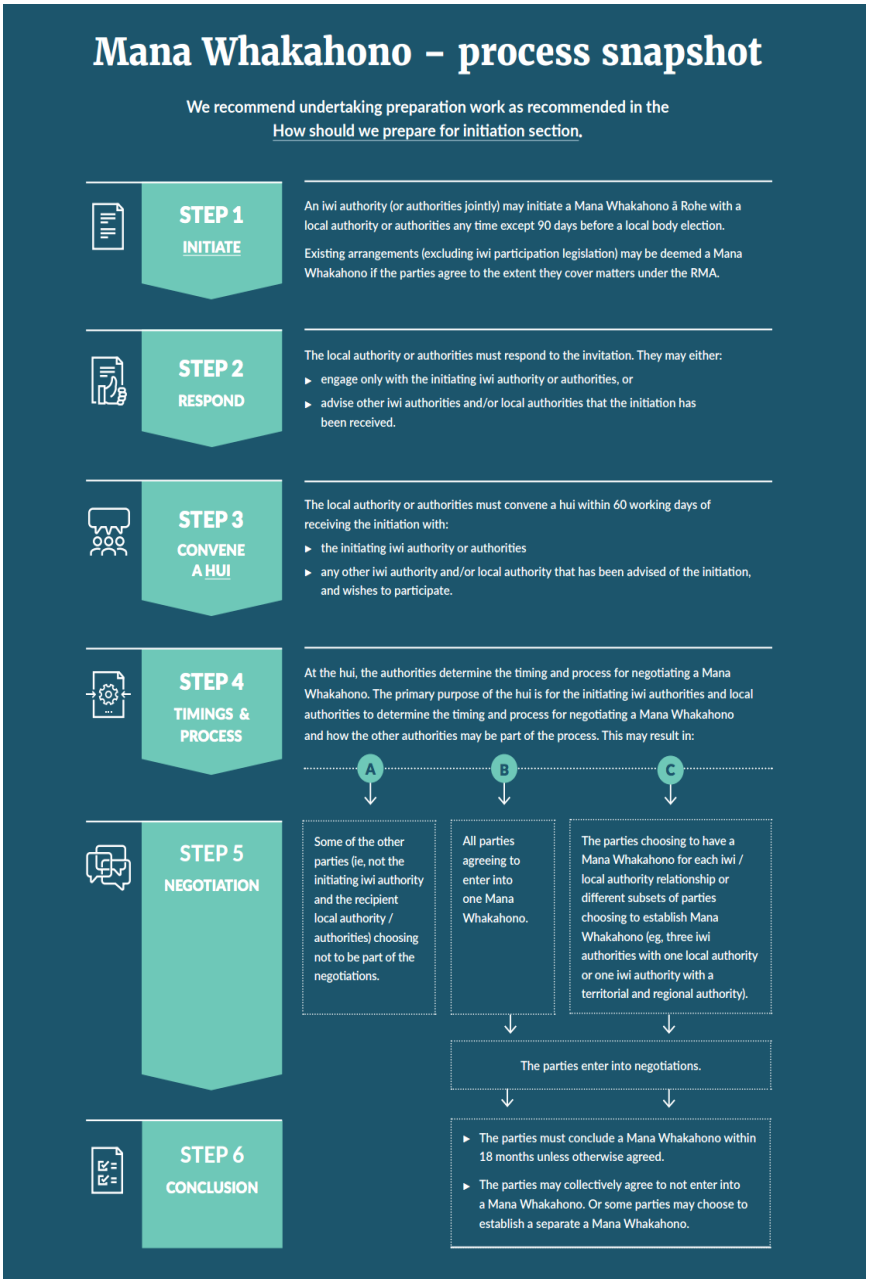



*Figure 24: Mana Whakahono process snapshot.*

From: Ministry for the Environment (MFE) 2018 Mana Whakahono ā Rohe guidance: http://www.mfe.govt.nz/sites/default/files/media/RMA/mana-whakahono-guide_0.pdf

The exploitation of minerals has been facilitated throughout the years by the signing of the Treaty of Waitangi in 1840 between representatives of the British Crown and Māori tribes (Ruckstuhl, Thompson-Fawcett, and Rae 2014). The general rule of English common law is that owners of land have ownership of minerals below the surface of their land. However, in Aotearoa New Zealand, "several important statutory exceptions exist that vest ownership of certain

minerals in the Crown" (Ruckstuhl et al. 2014:29). As explained with respect to the Crown Mineral Act 1991 (CMA):

> Section 10 of the CMA gives special recognition to four minerals – petroleum, gold, silver and uranium – and endorses these as nationalised minerals. 3 Where these minerals exist in "natural condition in land (whether or not the land has been alienated from the Crown)" they "shall be the property of the Crown". Moreover, Section 11 of the CMA clarifies that any minerals found in its natural condition on Crown land that has been alienated (whether by way of sale, lease, or otherwise) since 1st October, 1991 remain Crown property. (Ruckstuhl et al. 2014:30)

As reported by the Waitangi Tribunal report on petroleum resources (2003), oil and gas have always been elements integrated in Māori cosmology. Māori communities have a long history of involvement in mining that is visible in the archeological record, such as the use of quarried rock for tools, trade, demarcation, ornamentation, and gardening (Ruckstuhlet al. 2014). The connectedness between man and nature is explained in the Petroleum report: "[m]aori in Taranaki [believe] that Seal Rock [known as Waikaranga], a submerged reef off the coast, had once been an island of bituminous matter, which had been ignited by a supernatural agency and had burnt to below sea-level." (Waitangi Tribunal 2003:5)

In 1975, an Act of Parliament established a permanent Commission of Enquiry called the Waitangi Tribunal in order to "investigate and make recommendations on claims brought by Māori relating to actions or omissions of the Crown, which breached the Treaty" (Ruckstuhlet al. 2014:305). Specific to the Taranaki region, in the past there have been a number of claims settled through the Waitangi Tribunal related to issues ranging from land appropriation to dairy industry restructuring (e.g. Wai 6: Motorui-Waitara Claim with Te Atiawa iwi; Wai 143: The Taranaki Report: Kaupapa Tuatahi[42]; Wai 758: The Pakakohi and Tangahoe settlement claims report with representatives from Te Iwi o Tangahoe Incorporated and Te Runanganui o Te Pakakohi Trust incorporated; Wai 788: The Ngati Maiapoto/Nagati Tama settlement cross-claims report; Wai 790: Taranaki Māori, dairy industry changes, and the Crown with Parininihi ki Waitotara Incorporation).

[42] The report covers 21 claims: five for Taranaki generally (the Taranaki Māori Trust Board, the Taranaki Iwi Katoa Trust, Nga Iwi o Taranaki, the Parininihi-ki-Waitotara Incorporation, and Taranaki Tribes) and the remainder for various kin groupings (Ngati Tama, Ngati Maru, Ngati Mutunga, Te Atiawa, Taranaki, Nga Ruahine, Ngati Ruanui, Tangahoe, Pakakohi, and Nga Rauru) or hapu within those groupings [as cited in Waitangi Tribunal. 1996. The Taranaki report: Kaupapa Tuatahi.]

In Taranaki, the mechanisms of land confiscation were carried through the New Zealand Settlements Act of 1863 and its various amendments as “a form of punishment for so-called Māori ‘rebellion’”(Waitangi Tribunal 2001:1). The government “targeted prime agricultural lands, particularly in Taranaki, Waikato and Bay of Plenty, bringing several impacts for Māori communities and their wellbeing” (Kingi 2008:1). In 1880, the West Coast Commission was created to “facilitate the return of some lands to Maori, […] and was followed by the appointment of a second commission in December 1880” (Waitangi Tribunal 2001:1). Their aim was to return some land to Māori “in the form of Crown-granted reserves with an individualized title—that is, shares would be allocated to Māori for ownership in Crown-administered reserves" (Waitangi Tribunal 2001:1). The West Coast Settlement Reserves Act of 1881 was amended five times and by 1892 the reserves were put into “a 21-year perpetually renewable leasing regime, with rents based on the unimproved land value” (Waitangi Tribunal 2001:1). With the Māori Reserved Land Act 1955, rents were established at 5 percent of the unimproved value of the land with the rent period remaining at 21 years.

The reports that followed found that the “perpetual leasing had estranged Maori from their ancestral land, making them trespassers should they walk upon land they owned” (Waitangi 2001:2). In 1975, the Commission of Inquiry into Māori Reserved Land recommended changes in the rent review process, suggesting their renewal every five years through negotiation between the parties. As a result, the Parininihi ki Waitotara Incorporation (‘PKW’) was established in 1976 to manage 55,137 acres and administer the land leases and rents. As outlined in the report:

> This and the previous commissions’ and inquiries’ recommendations were still not actioned in the years following the Sheehan commission’s report. As a result, the gross breaches, which had been left unhealed, were aggravated by this wilful turning of a blind eye to what had been very deliberate injustices (Waitangi Tribunal 2001:2).

In 1991, the Waitangi Tribunal's Ngāi Tahu Report was a catalyst for change in regards to the “perpetual leasing regime as it operated under the 1955 Act” (Waitangi Tribunal 2001:2). The report found that the perpetual right of renewal in the leases of Māori reserved land was “inconsistent with the principles of the Treaty of Waitangi, as was the failure of the Crown to implement the Sheehan commission’s recommendations relating to the renewal of terms and reviewing of rents” (Waitangi Tribunal 2001:2-3). The report further reiterated how the process had estranged Maori from their land, causing indignity for those who had already been reserved

inadequate lands. The tribunal thus recommended amending the Maori Reserved Land Act 1955 to:

> a) convert perpetual leases to term leases for two 21-year periods;
> b) immediately change the rental basis from fixed percentages to freely negotiated rents subject to the Arbitration Act [1908];
> c) immediately change the rent review period of 21 years to 5 years in respect of commercial and rural land and 7 years in respect of residential land (Waitangi Tribunal 2001:3)

In 1996, through the Taranaki report, the Tribunal described the bitterness regarding the perpetual leasing system, leading Māori landowners to reflect on the missed opportunities over the last 100 years to develop the experience and infrastructures themselves:

> People were deprived of farming opportunities and the chance to grow with and be a part of the local economy. Investment opportunities were lost as well, along with the chance to develop new ventures from borrowing against the land. The business expertise and infrastructure that might otherwise have grown did not develop. The social cost has also to be considered. Kin group structures based on ancestral land interests were set asunder. People were forced from their land and the district with only the prospect of labouring for a living. The control of the reserves and the perpetual lease programme were forms of confiscation, forced removal, and social control by administrative stealth (Waitangi Tribunal 1996: 256-257).

Following the issuing of the Taranaki Report, the Tribunal endorsed the proposal advanced in the Ngāi Tahu Report 1991, converting leases from perpetual to a term leasehold over two 21 years periods, and including rent reviews at least every five years. In 2001, through the Dairy Industry Restructuring Act 2001, the government authorized the amalgamation of New Zealand's two largest dairy co-operatives—New Zealand Co-operative Dairy Company Limited and Kiwi Co-operative Dairies Limited–into Fonterra Co-operative Group Limited. The result was ownership by Fonterra of all the shares in the New Zealand Dairy Board. This process aimed at maximizing "the returns from the [dairy] industry to New Zealand while protecting the interests of New Zealand dairy farmers and New Zealand consumers" (Waitangi Tribunal 2001:11).

The restructuring affected various Taranaki and PKW dairy farms. A sample of farms gathered by valuers John Larmer and Ranald Gordon "showed an increase in land value (land value being the sum of the value of the unimproved land plus improvements on and to the land), said to be common across Taranaki" (Waitangi Tribunal 2001:12). The increased land value led

to another claim put forward (Taranaki Māori, dairy industry changes, and the Crown: WAI 790, with PKW) concerning the dairy industry restructuring and still addressing the inequity of perpetual leasing:

> Since the creation of the PKW Incorporation, [claimants] have lost investment opportunities and have not been able to develop business expertise and infrastructure, nor have they been able to enter the dairy industry on their own lands. We therefore see an important aspect of the claim as the Crown's failure to act in a timely manner on the recommendations of successive inquiries and commissions and, in particular, those in the 1975 report of the Sheehan commission and the Ngai Tahu Report 1991, relating to the inequity of perpetual leasing. Had perpetual leasing been addressed as it should have, this claim might not have been necessary, since the claimants would have been involved in the dairy industry in their own right prior to the increase in share values (Waitangi Tribunal 2001:8).

The tribunal determined that another primary breach involving Taranaki Māori had occurred following the dairy restructuring, in addition to the existing historical breaches. The tribunal therefore recommended:

> 1. That the Crown should assist PKW to buy shares as required to ensure supply on farms as they are resumed. The Crown should do this by guaranteeing loans within the following parameters:
>
> > (a) the loans should be no greater than the sum of the value of the shares at acquisition cost;
> > (b) the loans should be applied to purchase of shares in Fonterra; and
> > (c) PKW net assets should not be less than 35 per cent of their total assets (which is the ownership ratio in PKW's 1998 land management plan).
>
> 2. That, on the possibility that rents are reduced in real terms in the future and it being shown that unbundling has been a significant contributor, the Crown should make up the rents to the extent of the unbundling contribution.
> 3. That the Crown should reimburse the claimants' and/or PKW's reasonable legal and witness expenses in prosecuting this claim. It was brought with dispatch and conducted in a measured way, having regards to the economics of litigation (Waitangi Tribunal 2001:40).

In regards to oil and gas, of particular interest is Wai 796: The Petroleum report, which addressed claims by iwi Ngā Hapū o Ngā Ruahini of Taranaki and Ngāti Kahungunu of Hawke's Bay and Wairapapa in relation to their interests in petroleum resources. According to the Waitangi Tribunal (2003:5): "[b]oth claimant groups assert that in terms of customary law, Māori as part of their natural world have proprietary rights in the resources of their universe, including the petroleum within their lands." Following this report, recommendations were made to negotiate between the Crown and the affected Māori groups for the settlement of petroleum

grievances. The Waitangi Tribunal pointed out that a treaty interest was created in favor of the Māori for the loss of legal title to petroleum resources following a Treaty breach. Ruckstuhl et al. (2014) report that where an injustice is accepted to have occurred, the Māori claimant group will receive an acknowledgment and apology from the government. In addition, the claimant group will receive compensation in the form of "a cash or property settlement and various types of 'cultural redress' that, among other things, give Māori input into decision-making on the geographical localities with which they are connected, including whether changes to land or water uses will impact on Māori environmental or cultural values" (Ruckstuhl et al. 2014:305). Regarding the regulations of fracking activities in New Zealand there are five key statutes that the industry is obliged to observe:

(1) Crown Minerals Act 1991
(2) Health and Safety in Employment Act 1992 – Health and Safety in Employment (Petroleum Exploration excavation) regulations 2016
(3) Hazardous Substances and New Organisms Act 1996 (HSNO)
(4) Resource Management Act 1991 (RMA)
(5) Historic Places Act 1993 (HPA)

The following table gives a more in-depth look at the regulations used for hydraulic fracturing in the country:

| Regulations and acts | Description |
|---|---|
| **Crown Mineral Act (CMA)** 1991 | A resource allocation statute. Through this statute permits for oil and gas exploration are issued and regulations associated acts with permits are laid out. The Crown Mineral Act establishes the level of royalties paid by companies to the Government. |

| | |
|---|---|
| **Health and Safety in Employment Act (HSEA)** 1992 | This act deals with the management of risks to the health and safety of people on particular work sites. The regulations have specific provisions in order to manage these risks at petroleum exploration and production facilities. This Act is administered by the Ministry of Business, Innovation and Employment (MBIE) and sets out the responsibilities of people on a particular work site. The regulations have specific provisions in order to manage these risks at the petroleum exploration and production facilities, MBIE and sets the responsibilities of employers, contractors, the self-employed, and employees. Any oil rig, seismic survey operation area, or area of geological mapping within New Zealand's Territorial Sea is defined as a workplace under this legislation. The HSEA is linked to the HSNO. |
| **Hazardous Substances and New Organisms Act (HSNO)** 1996 | This act manages the risks associated with the manufacture, importation, storage, use, and disposal of hazardous substances. Such substances include lubrication oil drilling chemicals and, oil spill dispersal agents. The Biosecurity Act 1993 establishes the mechanism for preventing incursions of unwanted organisms that may arrive in New Zealand with oil and gas structures that are brought in by sea. |
| **Historical Places Act (HPA)** 1993 | This act protects archaeological sites, whether recorded or unknown, from destruction, damage, or modification. |
| **Resource Management Act (RMA)** 1991 | This act addresses the sustainable management of natural and physical resources, including the potential effects of activities on the natural and physical environment. Hydraulic fracturing activities are predominantly regulated under the Resource Management Act. The RMA is New Zealand's primary statute setting outdefining the management of the environment and natural resources, particularly focusing on how the effects of activities should be managed. An application to undertake hydraulic fracturing must comply with the RMA's requirements. All resource consents granted under the RMA must be consistent with its general purpose: to promote the sustainable management of natural and physical resources. Controls can be set by local |

| | |
|---|---|
| | authority decision makers in two broad ways under the RMA. |

*Table 6: New Zealand Regulations.*

*Sources Compiled fromcited: New Zealand Legislation 1991; Environmental Foundation 2018).*

The purpose of each of these statutes is very distinct and they are applied either individually or in combination throughout the different stages of any hydraulic fracturing process.

When choosing where to drill, it is essential to gather as much information as possible on the geology of a region "in assessing the potential for oil and gas to exist, and whether fracking may be required to access it" (PCE 2012:32). Seismic surveys allow the collection of accurate data on where oil and gas may be present, providing information on the types of rocks forming the different layers, the presence of geologic faults, and the depth and extent of aquifers (PCE 2012:32). Surveyors generate seismic waves "by artificial methods, typically by small explosive charges lowered into shallow bores known as 'shot holes'" (MfE 2014:16). These seismic waves bounce off different subsurface formations and are recorded by sensors called geophones, revealing information on the mechanical properties of each formation. The PCE (2012:32) reports that "[o]n the basis of this information, companies holding permits decide whether and where to undertake exploratory drilling. They also take into account road access, proximity to houses, topography, and landowner agreement."[43]

Once a company chooses where to drill, the next step is to establish the well site. First, the company obtains resource consent through the local councils. As mentioned in the Parliamentary Commissioner for Environment report, "[i]n applying for resource consents, oil and gas companies need to show how they will manage the effects on the environment. For example, earthworks and excavation generate sediment, and a plan to control runoff and protect any waterways would need to be included in an application" (PCE 2014:55).

Multiple consents can be applied for and saved for later in the drilling process or they may be 'unbundled' and applied for separately. Bundling the consents simplifies public participation at joint hearings held at the council's office if potential issues arise. However, companies tend to prefer unbundling resource consents. There are mixed views on unbundling:

[43] I will discuss in detail the controversial aspects related to information given to landowners by companies during the pre-drilling (seismic surveying), drilling, and post-drilling phases in Chapter Seven- *Activism through the mountains and the rivers: Community responses to oil and gas development.* In this way, I will be able to avoid fragmenting stories and perspectives on how the presence of fracking has impacted my participants.

while some see this approach as a good way to stage a development by ensuring consent and considering it in terms of individual merit and minimising potential delays, others view this strategy poorly because it does not account for cumulative effects as well as denying public participation (PCE 2014). As previously mentioned, resource consent applications are required through the Resource Management Act (RMA 1991) and given/controlled by local and regional councils. An activity requiring resource consent can be classified under one of the following five categories:

1. **Permitted**: No resource consent is necessary, and the activity can be undertaken (New Zealand Government1991)

2. **Controlled:** Activities that require a resource consent from the Regional Council, but which will always be granted by the Council. Controlled activity consents give certainty to users and if well designed should be relatively easy (less expensive) for councils to administer (New Zealand Legislation 1991).

3. **Restricted discretionary:** Restricted discretionary activities are those for which the Regional Council has restricted the exercise of its discretion (Environment Foundation 2018). The Council limits the range of matters it considers and only sets conditions (if the resource consent is granted) that are relevant to the matters in which it has restricted its discretion (Environment Foundation 2018; New Zealand Legislation 1991).

4. **Discretionary:** Discretionary activities are those where the council retains full discretion. An activity is discretionary if "the plan identifies it as discretionary; if a resource consent is required for the activity but the plan fails to classify it as controlled, restricted discretionary, discretionary or non-complying; if the activity is described as prohibited by a rule in a proposed plan which is not yet operative. (Environmental Foundation 2018)

5. **Non-complying:** Activities specified as non-complying within the rules of a regional plan are activities that require resource consent from the Regional Council, but which the council may only grant if the consent application meets RMA criteria as well as the objectives and policies of the regional plan (Environmental Foundation 2018). A resource consent can be granted for a non-complying activity, but first the applicant must establish that the adverse effects of the activity on the environment will be minor or that the activity will not be contrary to the objectives of the relevant plan or proposed plan (the 'threshold test')(Environmental Foundation 2018).

6. **Prohibited**: A prohibited activity may not be carried out. In addition, no resource consent can be sought or granted to authorise the activity (New Zealand Legislation 1991).

As of May 2011, resource applications for fracking are required and these must always be accompanied by an Assessment of Environmental Effects, which outlines the effects the activity could have on the environment and carried out by the company. When a company applies for resource consent, the council considers whether the effects are minor, and if so, no public notification occurs. As the Parliamentary Commissioner for the Environment (2012:94) reports "[t]his happens in 95% of consent applications." On the other hand, if the council decides the effects are more than minor "under the Resource Management Act 1991 (RMA) s 95A, it publicly notifies the consent, and any member of the public is able to make a submission on the application" (PCE 2012: 94). However, often notification can be limited to affected parties, and this could include people living above a well, even if the well head is not on their property. Between 2011-2012, Taranaki Regional Council (TRC) granted 234 non-notified consents across the regulated activity. Among 79 applications submitted, iwi were consulted either by the applicant or the council, and during that period TRC "reported a total of over 550 community consultations regarding total resource consent activity for the Taranaki region" (PEPANZ 2019:1).

After successfully gaining a permit, the holder obtains exclusive rights to the hydrocarbons found under the ground in the area covered by the permit. Permit areas can be of different sizes and "a single permit can cover an area of thousands of square kilometers" (PCE 2012:53). The company then makes the decision to drill within the permit area based on the geological information gathered through the seismic survey and the expected commercial viability. Moreover, this decision has to take into account two points:

- *Ease of access to the land.* Land owners do not own the oil and gas under their land and cannot prevent a permit-holding company from drilling on their land. Some landowners will readily agree to give companies access to their land but others will not.
- *Ease of gaining resource consents from councils.* A company will not be able to drill for oil and gas if it is unable to obtain the necessary resource consents from councils, or if the conditions placed on the consents make the enterprise "uneconomic or impracticable" (PCE 2012:54).

According to the Parliamentary Commissioner for the Environment, consent is not required to drill for oil and gas in Taranaki as drilling is considered a permitted activity in the region. Community members I interviewed expressed strong opposition to how the Taranaki region represents an exception while in other parts of the country any type of drilling activity

requires consent. However, when a well in Taranaki is to be used for deep well injection resource consent is required and extra conditions to prevent well failure can be imposed. Prior to July 2011, the Taranaki Regional Council did not require resource consents for the more than 50 fracking wells that were performed up to that year (PCE 2014). After the legality of unconsented fracking was put into question, the Taranaki Regional Council has required resource consent for hydraulic fracking (PCE 2014). A resource consent is now needed for injecting fracking fluid except where the fracking is being done to extract gas from a coal seam. The exception is because "water that lies within a coal seam is usually regarded as an aquifer, injecting fracking fluid into a well drilled into a coal seam is a discharge to water" (PCE 2012:58). The drilling process is also subject to certain standards. For example, the well must be "cased and sealed to prevent the potential for aquifer cross-contamination or leakage from the surface" (TRC 2012:30). However, as reported by the Parliamentary Commissioner for the Environment, the council thinks that they have no need to check compliance with this rule, because "[t]he reality is the requirements associated with environmental protection that relate to well integrity are precisely those that relate to health and safety addressed in the petroleum regulations" (Taranaki Regional Council 2013b:8). Considering the different rules, the PCE's reports address how there is a lack of guidance from the Taranaki Regional Council when looking at the cumulative effects of the increased activity. Often the "relatively 'hands-off' approach to well location in Taranaki seems to rest on the assumption that properly designed and constructed wells do not leak" (PCE 2014:36).

New Zealand isn't immune from accidents and failures reported on well sites and well integrity. In 1995, the McKee-13 well blowout took 35 hours to manage the situation and re-establish control of it. In 2010, another incident occurred in the Cheal Oil Field. As reported through the Taranaki Regional Council in a letter from TAG Oil in 2011, a leak 1300 meters below the ground occurred when "hot water [was] injected to enhance oil recovery leaked from patches on two production wells into another deep rock formation" (PCE 2014:38). The well integrity was subsequently reported breached.


*Figure 23: Copper-Moki fracking site. Photo by the author*

When granting consent, the council sets conditions including specific baseline standards of measurements for local groundwater monitoring. If the fracking fluid is mainly water based, as is common practice, the company needs to apply for consent to take water from surface or groundwater sources. However, prior to May 2011, in regard to landfarming activities, fracking fluid "was not specifically identified by Taranaki Regional council in land farming consents because it was assumed to be a general drilling waste" (Bloomfield and Doolin 2017: 2464).

Metze (2017) explores landfarming in New Zealand, explaining how this practice has been carried out exclusively in the Taranaki region. The average well in Taranaki produces four thousand cubic meters of drilling waste (Radio New Zealand 2013). This waste is transported to land farms where it is applied to an "area from which the topsoil has been removed and stockpiled" (Bloomfield and Doolin 2017:2462). After the waste is dried, it is tilled into the subsoil, the removed topsoil is restored, and the area is fertilized making the area suitable for pasture. Landfarming has been argued to "improve the soil, potentially making marginal land more stable and productive" (Taranaki Regional Council 2013:1).

In our interview, Sarah tells me her mixed feelings on landfarming and when seeing oil rigs so close to dairy farms, or in some circumstances, rigs directly sharing the land with cows and other grazing creatures.

Sarah: Don't get me started on landfarming. They were landfarming at the sites as well. Lots of people don't realize companies were landfarming at the sites. And all of this is so different than in Canada, or from Australia. In the sense that: there is your dairy farm taking milk for consumers and right in the middle of the dairy farm there was an oil rig, a gas rig, drilling on there, with all their fumes, all around discharge of all sorts. With cows still grazing. And I thought: "What an absurd thing for New Zealand where Fonterra was sourcing its milk from cows grazing in that environment." And that is what brought the issue on land farming. There was landfarming where cows were /…/. Landfarming is still going on and all the landfarming that existed before can still do it, and they will still have to test their milk. But no new farm can landfarms on them. I would like to go a step further and ask for no dairy farms to be allowed to do landfarm. Or if you are, you buy enough land for that site to be only a wellsite. And not be used for grazing cows. Or…There should be a distance as well.

Anna: Yes, because for me it is confusing… I interviewed like…. people from Federated Farmers and they don't seem to be worried about cows getting sick or…

Sarah: But I haven't lived long enough to see if they are going to get cancer, those cows, but it is more about the intake in the milk and what it can cause to people that drink it. Not their cows. I talked about it with a vet before and he said that is more of a concern that the discharges will be on the grass, in the soil, and in the water and it will get to the cows through that, from what they eat. They won't live enough for the cancer to begin in their body… they say it is unlikely for them, but it is more about being uptaken in the milk and being passed on. So now there is a guideline for primary industry that you mustn't have any livestock grazing on this type of land until it reaches its end point, but there is a problem with that, because it is only a guideline, they can't enforce it.

Anna: Ah ok.

Sarah: And any pre-existing farm that already has it on it has rights prior to that to continue to operate. So, it is up to the milk companies to make sure that they deal with it.

In June 2013, landfarming made headlines when Fonterra, New Zealand's largest dairy producer, was declared to be supplied with milk from Taranaki farms where landfarming was occurring (Bloomfield and Doolin 2017). Though Fonterra announced confidently that their milk was safe, later they announced that they would no longer issue any contracts for milk from dairy farms that performed landfarming of oil and gas waste. The CEO of the Petroleum Exploration and Production Association New Zealand (PEPANZ) stated "Fonterra have categorically said the milk is safe, science tells us … It's about the cost of testing to provide that reassurance. We will look at ways to share that cost or pick it up" (Ewing 2013). Bloomfield and Doolin (2017:2465) mention that "[i]ndustry groups with an interest in landfarming were … keen to mobilise the authority of science in defence of the practice." Representatives of Federated Farmers, such as

Harvey Leach, stated that no issue had been scientifically reported by experts on effects caused by landfarming in the area. Dr Edmeades, who worked on a report for the Taranaki Regional Council, stated that the matter was reported as landfarming opponents ‘‘ignoring science’’ and that environmentalists were opposed to any progress, emphasizing that many claims made toward landfarming were based on emotions rather than scientific evidence (Bloomfield and Doolin 2017). However, environmentalist groups such as Climate Justice Taranaki (CJT) have attempted to provide scientific evidence of the potential long term negative effects of landfarming, commenting “on the lack of consideration of off-site environmental effects and the small sample size, [and how] ‘‘only three completed landfarms were examined’’(CJT 2013) [as cited in Bloomfield and Doolin 2017: 2467]. Critics of the Taranaki Regional Council report have condemned the sampling technique used, judging the report flawed as the set of samples appeared limited and the soil and pasture samples came only from completed landfarms without considering off-site effects. As Metze (2017) stresses, more importantly, however, drawing attention to test results from the specific space of a landfarm inevitably masks the lack of information about the environmental effects beyond—for instance runoff into waterways or onto adjacent land. Concerns expressed by some Māori have stressed how transferring drilling waste from outside the region to Taranaki represents a “culture offense” (Māori Television 2013) and poses “risks to waterways and wahi tapū (culturally significant sites) (Māori Television 2013).

As I discuss the positive and negative aspects brought by the presence of the oil and gas companies in the region, Tama, former oil and gas rigger, and now Department of Conservation Ranger involved in the predator free programme known as Taranaki Mounga, points out to me how several complaints have been raised against this process, underlining how it has been reported the contamination to the Mimitangiatua Awa (Mimi River), where the waste coming from fracking operations has spilled into streams and tributaries connected to the river:

Tama: A lot of water is used in fracking operations and then you get all drilling waste. And it has to go somewhere. And they have this issue at the moment...they take their waste to a worm farm and have been having spils into the river. So it just keeps going on and on. One of the local iwi has filed a complaint.
Anna: Where exactly?
Tama: Uruti. Ngati Mutunga has put a complaint. One of the rivers has been heavily poisoned with this drilling waste spilling from the worm farm. So there are more negatives brought by companies in general.

What Tama is referring to is the Uruti Vermiculture Composting facility, managed by Remediation NZ. As reported by TRC, Remediation (NZ) Ltd. is a company specialized in organic fertilisers, by processing and converting via vermiculture and composting "a wide range of organic waste streams into marketable biological products that can be safely placed back on to agricultural and horticultural land as a beneficial fertiliser and soil conditioner" (TRC 2019:4). In operation since 2001, Remediation (NZ) Ltd has claimed to offer a sustainable method for dealing with unwanted organic waste streams.

The company holds six separate consents with the Taranaki Regional Council, "comprising approximately 90 conditions. Two of the consents for the site expired on 1 June 2018" (TRC 2019:5). Martin (2020) reported how Remediation NZ will continue to accept stormwater runoff from oil and gas sites while more than 20,000 tonnes of drilling muds are remaining on site contained in bunds. In their application, the company has stated how vermiculture and composting components have had minimal effect on the environment. In 2019, Ngati Mutunga submitted an application opposing the renewal. In their submission, the iwi representatives pointed out how the renewal of the consent will have significant adverse effects including cultural and social impacts, effects on amenity resulting from discharges, wastewater effects, odour and dust effects caused by the worm farming activity. In November 2020, in an article published by Taranaki Daily News, Ngati Mutunga announced placing a rāhui- a temporary ritual prohibition – due the cultural health and mauri (force)of the water in the awa (river) becoming degraded. This will be effective until the state of the river improves:

> Water has spiritual qualities of mauri and wairua … These qualities are related to the physical wellbeing of the water, and are damaged by overexploitation, pollution or misuse of water … Ngāti Mutunga are the Kaitiaki (caretakers) of the whenua and wai within our rohe, and consider that the cultural health and mauri of the water in the awa has become degraded over recent years, meaning Ngāti Mutunga consider that it is not safe to gather and eat kai from the awa or to swim there. Without healthy water you won't have a healthy rohe (tribal area), and without a healthy rohe you can't have healthy people.(Persico 2020: 1)

As reported by Radio New Zealand, locals have complained of "smelling the hydrocarbons in the water by the white baiters and seeing foaming coming down the river and we've reported this to the Taranaki Regional Council" (Martin 2020:1.). Many have urged for a quick solution, stressing the cultural impacts that it is causing to them, their land and their ancestors:

> And as tangata whenua, my ancestors would not be happy with what's going on. And my ancestors are buried on that river. That river is a life support to our community. (Martin 2020: nd.)

Since 2016, local members have submitted more than 17 complaints to the regional council. In many occasions several infringement notices as well as non-compliance from the company have been reported. In 2019, Remediation NZ failed its annual monitoring due to contaminants such as chloride and significant levels of ammoniacal nitrogen found in the Haehanga Stream and associated tributaries. Martin (2020) recalls how in 2010 "the company was convicted over objectionable odours at Uruti and fined more than $33,000" (Martin 2020: 1).
Grassroots activist groups such as Taranaki Energy Watch (TEW) and Climate Justice Taranaki (CJT) have expressed their concern on fracturing fluids and produced water disposed at the site, mentioning how the Parliamentary Commissioner for the Environment (PCE) stated that these types of contaminants be disposed of through deep well injection. CJT's members have firmly asked for the consents to be refused, underlining how the Council's environmental assessment:

> The discharges result from a large-scale waste management operation. The operation involves storage of large volumes of waste material, and the disposal of leachate and stormwater, from that waste to groundwater adjacent to a stream, and to the stream itself. In addition, the waste material has the potential to emit significant odour. The documentation provided with the applications does not demonstrate that adverse effects will be minor. (Notification decision, 07/01/2019: Doc# 1978195) [CJT 2019:1]

In their submission to the regional council, TEW pointed out a lack in properly monitoring the substances received, in particular the significant quantities of oil and gas waste received at the site. Testing of the final product of the composted material provided with the company's application doesn't analyze any quantity of benzene, toluene, ethylbenzene and xylenes (BTEX) and polycyclic aromatic hydrocarbons (PAH) as required when drilling waste is being used at the facility. Constant monitoring and assessment against resource consent conditions should be done multiple times a year by local government inspectors. As reported by PEPANZ (2016:19):

> These inspectors make sure all activity adheres to resource consents granted by councils under the Resource Management Act. Central government regulators also regularly visit production stations to ensure these stations are operating safely. Monitoring pays special attention to stormwater discharges, drilling mud storage and disposal, treatment facilities and receiving waters. Inspectors also monitor off-site receiving environments. Water samples are also taken of stormwater discharges.

Nonetheless, as explained to me by my interviewees, that incidents and breaches of consent of oil and gas industry happen more often than one would hope. In 2014, Climate Justice Taranaki (CJT) reported and documented non-compliant incidents involved a chemical spill at Methanex Motunui, an oil spill at Port Taranaki, and non-compliance by Remediation NZ, Greymouth Petroleum (Kowhai-C and Ngatoro-A wellsites) and Todd Energy Taranaki (Mangahewa-D wellsite). They expressed their concern on Remediation NZ:

> The company has breached conditions on the application thickness of waste material and the number of times waste was spread on one area. Notably, this follows three unauthorised incidents in 2012-2013 that resulted in an abatement notice, an infringement notice and a "poor performance" rating by the TRC. This is the same site where an inspector reported cattle in an area recently spread with drilling waste and not yet tilled or sown(Climate Justice Taranaki 2013)

The Taranaki Regional council warned that stock should not be put on recently spread oil waste, but at the same time expressed that "it's not responsible for the regulation of livestock or animal welfare and food safety issues" (Radio New Zealand 2014).

A confusion in the regulations and monitoring that has occurred as well when considering wellsites and their dismantlement or abandonment once production reaches its final phase. As reported by The Taranaki Regional Council and the Ministry for Environment reports that the abandonment of a well when hydraulic fracturing or drilling activities are concluded does not require a resource consent and dismantling a well is unregulated[44]. Dismantling is therefore classified as an allowed activity. However, there is a gap in the regulations where the well may be neglected and unmonitored, resulting in possible leaking and the continued degradation of the well site. As PCE (2014:45) reports

> the likelihood of an abandoned well leaking increases with its age. Moreover, there is no guarantee that the company that drilled the now abandoned well will still be operating in New Zealand. Under law, once a well has been abandoned and 'signed off' by the High Hazards Unit and the councils, any leaks from the well become the responsibility of the owner or occupier of the land.

[44] An abandoned well is defined as "a well that is plugged in permanently for some technical reasons in the drilling process. An oil well is referred to as abandoned if the economic limit of the well is reached. Thereafter, the tubing of the well should be removed and sections of the wellbore filled with concrete" (Petropedia 2021: n.d.).

In 2007, the Geological National Science (GNS) agency reported the existence of at least 350 abandoned onshore oil and gas wells (Reyes 2007:4). In 2017, the Ministry of Business and Innovation for the Environment undertook a review of the more than 960 onshore wells drilled over the last 150 years. For many of the wells, their production was limited or did not occur at all due to the low quantities of hydrocarbons encountered. Well locations were often created "beside naturally occurring oil seeps and this at times has led to misinformation about the wells causing the oil/gas to appear at surface when this is not the case" (MBIE & Petrofrac 2018:25). When considering early well production, no regulations were put into action for abandonment procedures. Wells were often "abandoned by simply filling the wells with whatever was available locally—well cuttings, scrap iron, sand, rocks, gravel and wood" (MBIE & Petrofrac 2018:25). Beginning in the 1960s, companies applied more modern abandonment practices. Nonetheless, "[o]ver the years, a number of operators have 'disappeared' through bankruptcy, mergers & acquisitions and transferring their business overseas" (MBIE & Petrofrac 2018:25). A number of wells were "found to have outstanding plugging and abandonment (P&A) commitments, i.e. these wells are not recorded as having been plugged and abandoned" (MBIE & Petrofrac). One hundred and four abandoned wells reported fell into that category. Consequently, MBIE contracted Petrofrac Well Engineering (Petrofrac) "to conduct a desktop review to determine the technical integrity of the 104 wells, and provide a methodology that ranks the risk these wells pose, which will be used to prioritize any activities to address this risk" (MBIE & Petrofrac 2018:10). In the report, Petrofrac concluded that 14 out of 104 required priority action. These at-risk wells were defined as "wells where either an abandonment activity has been assessed as being inadequate" to the point that the well "has the potential to flow hydrocarbons" (MBIE & Petrofrac 2018:10) to the surface. However, as reported by Radio New Zealand (RNZ), MBIE has failed to act on the report, affirming that none of the most-at-risk wells are leaking, thus "there is no immediate danger to personnel or the environment" (Martin 2020:1). The orphan wells have become a problem impacting many areas of New Zealand. Four wells identified near Wairoa, Hawke's Bay, North Island, are wells belonging to Westech Energy New Zealand, which suspended its drilling operations between 1998 and 2007. Ngati Kahungunu, Iwi environment and natural resources director, stated to Radio New Zealand that they were left in the dark about the status of the Wairoa wells: "[w]e definitely haven't had any kanohi to kanohi (face to face) engagement and we haven't heard of any engagement occurring in Wairoa directly with the

locals so it is a concern that this is happening and that some of the wells for priority action are located in Wairoa" (Martin 2020). Among the 104 wells investigated, 39 wells were unable to be located, despite having the well coordinates and the use of a magnetometer. In Taranaki, two of the 14 priority action wells are on the list of the missing ones. For example, the Tikorangi-1 well should have been located in a paddock, but no evidence of the well could be found. The reason for the missing wells could be due to "the wells being abandoned soon after drilling, all equipment being removed and the land being re-used" (MBIE & Petrofrac 2018:26). As reported by the Parliament Commissioner for the Environment (2014:38), several old, abandoned wells have been reported leaking in New Zealand; these wells were abandoned before modern practices were adopted by the industry in 1965. Despite the new practices, wells have been often abandoned after 1965 improperly and are "considered to be at risk of failing and releasing gas into the atmosphere" (PCE 2014: 38].

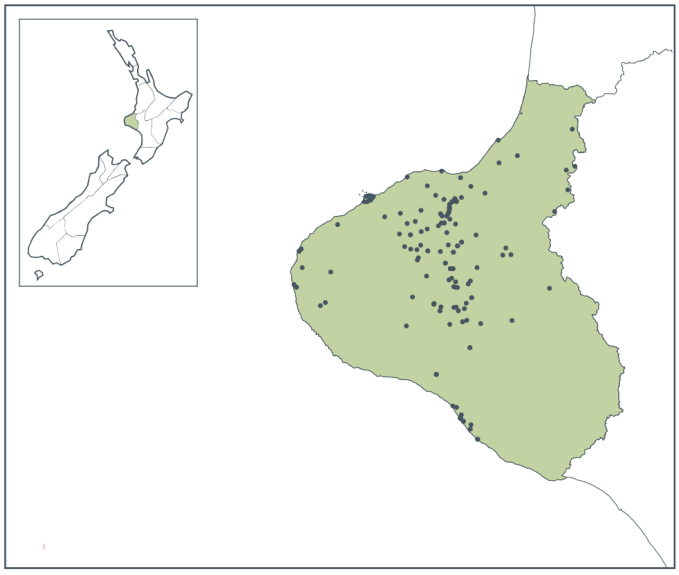



*Figure 24: Map showing abandoned wells distribution in Taranaki*

During my meeting with representatives and experts at Todd Energy, I inquired more about the possibilities of natural impacts caused by the degradation of a well and improper abandonment of it, to better understand how remediation works and what the common practice around Taranaki

is. N.D, environmental manager engineer, explained to me some of the steps they take once a well reaches its production limit:

> ...if the well it is still present on a site, someone will have a commitment to remove it, if it is no longer in production. 20-30 years down the track when all the wells are finished producing we as a company have a commitment to go into those well sites and there is an abandonment process, where you isolate various zones in the well by filling up with natural substances like concrete and cut it off a couple of meters under the ground surface. It is all plug and abandonment, put all that on top and you just returned the land back to farmland. That is a common practice...a lot of people feel that various wellsites are coming through existence through the years but they are quite a key essence to a field development so you generally don't make a hastily decision to rusin and abandon wells until you really know that there is no further opportunity to develop that part of the field or use the infrastructure in another way but yes…We carry those commitment to go back and abandon those wells properly. Making sure that there are never any issues with contamination and returning it back to farming…. So, if the well is not abandoned but functionable, it is suspended.

However, in our interview on one of the last days of summer, Sarah shared with me her concerns on the unspoken dangers of active wells suspended and later abandoned, and the possibility of leakages if not plugged correctly, the potential of explosion, leading to a loss of agricultural land, and the damage to the industry's reputation in case of any accident. Sarah described to me how in Taranaki there are a set of at least 15 production stations, where several wells can contribute to those stations from varying distances. Once they are not functionable anymore they are left unused, and become, as she defines them, 'orphan wells', and correctly plugging them should be a social responsibility of every company. Plugging a well ensures a higher level of "isolation the subsurface formations penetrated by the well" (Alboiu and Walker 2019:610). A correct isolation reduces and prevents possible contamination of surface water and groundwater from various runoff, gas, and hydrocarbons leaking from the abandoned well (Kell 2011; Khang et al. 2014). As Avci (1994) reports, these inactive and orphaned wells are sources of environmental and human health risks. Unplugged or improperly plugged boreholes "act as contamination pathways by creating vertical communication between hydro geologically isolated zones and linking aquifers" (Alboiu and Walker 2019:611). Among the many contaminants of concern (COC), methane is the most frequent and its emissions are "assumed to be the second largest potential contribution to total US methane emissions above US Environmental Protection Agency estimates (Kang et al 2014:1). When dissolved in water methane doesn't cause health

issues if ingested, however, it does "pose risks to human and environmental health as an atmospheric contaminant contributing to greenhouse gas (GHG) emissions. At elevated concentrations, methane can escape and cause possible explosion or fire hazard in poorly ventilated and confined areas" (Kang et al 2014:1).

Alboiu and Walker (2019:611) state "[i]nactive, suspended and orphaned wells not only contribute to adverse environmental and human health impacts, but also create economic liabilities to farmers who own the land." When companies drill on privately owned land, they receive access to surface rights through an agreement with the landowner who is compensated for the imposition through annual lease payments. After a well is no longer producing, if the well has not been reclaimed the landowner is at an impasse, landowners are unable to fully use their property for their own benefit, resulting in a loss of income. The inactive, suspended, and orphaned wells "create a substantial financial and environmental liability for the oil and gas industry" (Robinson 2014 as quoted in Alboiu and Walker 2019:611). The longer the inactive wells sit, the higher the costs become to properly decommission the wells. In the case of New Zealand, the total cost to correctly decommission the 14 priority action wells is "estimated to be $14.3 millions excluding the eight wells where further data acquisition is required" (MBIE & Petrofrac 2018:12).

The six priority action wells with sufficient data would cost up to $3.54 million to be closed. For the eight wells where there is missing data, Petrofrac has recommended undertaking a field data acquisition program. Broad estimates for the data acquisition and P&A costs fall around $944,000. However, "[w]ell abandonment costs can increase significantly if downhole condition differs from that documented or assumed. Generally, the deeper the well the more the cost of abandonment" (MBIE & Petrofrac 2018:12)

As I interviewed individuals living close to wellsites and production stations, industry experts/engineers, as well as administrative staff of district and regional offices, I inquired on their opinion toward the current regulations, what has worked and what has not. In our conversation, David McLeod, chairman of the South Taranaki District, delineated to me steps that are taken by the regional council in monitoring environmental degradation. McLeod explained to me what role the Regional Council plays and how the process of resource consent is administered. In his view, the regulations could be improved, overall, by speeding up certain processes to reduce long waiting times for companies.

DML: The first thing that...anybody to use the environment is either, number 1) they have to be compliant with the regional plan, have rules of what one can do with the environment up to threshold. Having a rural area, for example, a farmer can take a small amount of water catchment for the animals as long as they are not taking it when there is a low maintenance average flow when the water is very low in the stream. They need to take it elsewhere...if they can abide by the rules they can do whatever they want to do . But if they want to take more water or they want to do a big landing then they need a resource consent and that is when the regional council comes in. And administers that process to give a resource user like a petrochemical company, given them the right or not to be able to do that activity that they want to be able to do. And that process is primarily governed by the RMA here in New Zealand and there is a process by law that has to be carried out for a resource consent to do their activity or not. The Regional Council administers that process. If someone is successful in getting a resource consent to use water or to move a lot of land or whatever shall be that consent will also have conditions. They can do a lot of things as long as they don't breach these conditions. So very important part of the regional council is to monitor, to make sure that they are abiding by the conditions that they have the consent for and then lastly with that monitoring, and by the way that monitoring needs to be transparent we do reports annually for every report they have the consent for and that report goes back to the councilor the elected officials to make sure that we are happy with what it is happening but we are also making sure that any member of the public can have a look on the performance of the people that are having the resource consent. And then lastly, the regional council has the responsibility with that monitoring to carry an enforcement that needs be if someone is not behaving themselves. It is breaching the conditions; they need to be brought into line and make sure that they stay in line. The ability to give an infringement notice or if it is quite serious, we take to the Environment Court

Anna: Have there been any instances where the oil and gas companies…

DML: Many. Absolutely. Annually things happen...sometimes it is situations where mechanical failure… Something happens like a tree falls on a platform, or anything unpredictable with nature. But there are also times where human beings have made mistakes and they have done something. *All of those occasions* the regional council gets involved and establishes what has happened. Why it has happened, how it has happened. If there is negligence, if we feel that a company should have done better in that situation, then the council will hold them to account. Whether it is giving them a fine, infringement notice or there is a case to be presented to the Environmental court in front of a judge… So answer your question. It has happened many many many years since the regional council was formed back in the late 80s and 90s. Ehm in fact Taranaki in the early years, probably 5 to 10 years, the Taranaki Regional Council did more prosecutions than the whole government of New Zealand put together. We took it really seriously. That when we draw a line on the sand and someone steps over that we would take hold of them to account. We were quite strict in the early days so you could imagine what it was like. It was an arduous task but after some time everybody realized what the rules were. There were two sets of rules. If the line was set on the sand and they stepped over, they are going to get whipped that means that the integrity and respect of the Regional Council has grown over time and that means that the Regional Council is very clear on what they are expected and that anyone who steps on the liine knows that they will be

repercussions. There has been always cases, and I have been here for nearly 19 years. So, the regional council is being consistent that people behave themselves.

Anna: So, you think that the current regulations can have any improvement though?

DML: I think the regulations with resource consent that there are, they have their challenges. I believe changes could be made to make our job easier to be done. But it hasn't refrained us to or stopped us from doing what we believe is right or expect us to do. The law of the RMA has its strengths but also could be improved

Anna: Which area?

DML: I think some processes could be frustratingly long. For instance...I talked about the regional plans for the coastal environment, for air, for land, for freshwater. If we want to renew any of those and by law, we actually have to review those periodically. If we want to renew those processes of going and reviewing them, consulting the public, and putting out a plan for adoption, it is a long process. But then it can be drawn out very very long by appealings. So, people that appeal to what they want to do and people that have a sense of what they want to do, that can be drawn out for years. One example of getting plans adopted can be very drawn out and an arduous task and cost a community a lot of money. I think it can be better personally. So…for example this could be improved.

N.D, environmental manager at Todd Energy views that in New Zealand regulations are strong and the company can successfully adhere to them thanks to their effort of building a positive relationship with the community:

> I think the regulations are good. As I talked about it earlier they create a balance… you have got the community that is part of the process. It can have challenges but at the end of the day there are always going to be… a good outcome. Cause we got to engage with the community.Work through things. In terms of efficiency, it is not always the most efficient and gives the best outcome for everybody in the end. It keeps that balance. We have to look at everything.

In conversations with many interviewees, it often became natural to compare regulations present in New Zealand with other countries, such as Canada and the United States. A project manager working for an engineering professional services consulting firm in New Plymouth stressed to me the level of controls and permits required by each company, compared to the process in other countries. In his view, the bad reputation of fracking operations is a trend among environmental activists and supporters based on what they hear happening mostly abroad:

I: You know… it seems to me…and I hate to say this… that some of the people on the other side of the fence are personal friends…It seems it has become a trendy thing to complain about... that stuff is happening in other areas of the world, but New Zealand has been doing it for a *long long* time, responsibly. I guess I would compare to driving fast on the road… in Germany you can drive fast on roads because they are well regulated and there is an expectation of how those roads will be managed... so you can drive 200 miles an hour in Germany…you can't do that in NZ you know… because the roads are bad. I will spin that conversation around… and say…look these

are a bunch of stuff that are happening in other countries in the world because the industries are not well regulated, consent has been issued before any.... in the States… It is an interesting conversation because in my understanding of the States... the farmers own their land and all of the land under to the center of the earth… maybe bad frackers have gone there because farmers can give access to the oil and gas companies… whereas in NZ, the first foot of dirt it is controlled by the Crown Minerals department and government…and they have expectations that .. it is going to be done this way and this way…you know the oil and gas companies go through this incredibly rigorous process of getting exploration permits, and exploration permits are only valid until a period of time and then they have to jump through hoops to even get there… and then once they are given permission to develop that…they have to jump through more hoops… so it is incredibly regulated.

Similarly, R.R, an environmental engineer, originally from California, and who has been working on wastewater and water quality projects for the past decade in the Taranaki region, addresses to me the difference between regulations in New Zealand and other countries:

Anna: And here it is more regulated then?

R.R: Yes… I think that's right. I am not actually sure I wasn't involved in it. But when I went to wellsites it did seem to be more requirements. Where there were contaminated soils, they had to clean it up, contaminated water you are supposed to clean it up.

Anna: And it doesn't happen in the US?

R.R: I don't think so. I worked in the US and basically the oil and gas production were exempt from EPA regulations. The state could try but they never did. The oil industry was so powerful, and they could be paid for the regulators not to do anything. You don't see much here going on, but I am sure there isn't as much. Do I think the regulators all make sure that everything is great? Mhmm, maybe not. But there are rules. They have discharge consents and maybe funny stuff how discharge consents are obtained or compliant for. That's the TRC, it controls what goes on at wellsites. So, I will say...you can download their reports. And the TRC is better than my experience than in California with the US EPA and California EPA. They weren't really allowed to look at oil and gas operations, so if anything happened, if the contaminated water will leave the site, you could sue them. But the damage has already been done and by the time they are long gone. Run out of business or whatever.

M.R. a passionate investor in the oil and gas industry for nearly three decades, tells me how the rules throughout the years have become stricter, with companies increasingly showing care for the people around the area by communicating operations and actions that may occur:

M.R.: The rules for the oil and gas industry are stricter. OMV has spent quite some time for resource consents offshore, some offshore things they are going to drill. Tamarind is a

good example where they have just finished going through some consultation stuff for big oil rigs coming out there in the second quarter of next year. Chinese rig it is... and it was built last May. they are going to deviate wells too offshore… the interesting part too… it got discovered... they actually thought... they drilled the wells horizontally, 3/4 down, drill pipe sits along the bottom of the reservoir, therefore they can extract a lot lot more, a lot lot quicker. Ehm… There has been a little bit of flack from the Greens concerning that… but again they are…they have abided by the resource consents... ehm... I think it is much much stricter here now than what it has ever been. There is much more... rules to go through to get what the companies want... ehm and of course it all at a cost as well. I think A lot of people realize it… in some cases it is for the betterment of the industry because it is showing that the industry as a whole actually cares about what they actually do. It is nice to see, and we have seen in the last three weeks maybe longer than that... you... they will advertise especially on shore here rig movements...


GRAZING avail for 15—20 R2 Heifers or Cows from 29 Oct to 5 May. Ph 06 7548672.

GRAZING avail for up to 80 weaner calves. 20 mins from Inglewood or Stratford. Phone 027 252 4903.

Public Notices

TIGER TOWN TREASURE TROVE
Second Hand Shop Sale
Open till 8pm tonight
400 St Aubyn Street, New Plymouth

Rig Move Notification
ATTENTION ALL ROAD USERS

Greymouth Petroleum plans to mobilise Tiger Drilling Rig 246 from 9 Manganui Road, Everett Park to 1180 Upland Road, Inglewood. The traffic route for rig transportation will be from Kowhai D Wellsite, right onto Manganui Road, right onto Everett Road, right onto Waitara Road, left onto State Highway 3, left onto State highway 3A, right onto State Highway 3, left on Upland Road, right onto Kaimiro A Production Station Wellsite.

Rig mobilisation will commence on approximately the 20th of November 2018 and will take up to one week.

Tiger Drilling Company (NZ) Ltd apologises for any inconvenience caused during this time.

GREYMOUTH PETROLEUM

*Figure 25: Rig move notification on local newspaper.*

Several community members have questioned the strength of the regulations, often recalling episodes and situations that later became significant issues to their living conditions, leading them to handle the controversy legally. [45]

In my conversation with Robina, an educator from the *Ngaa Rauru iwi* who has been advocating and promoting sustainable practices through her work in the education system, she expresses how the lack of monitoring has affected the water and the way the land used to be and what young children could learn through hands-on experience activities. Despite changes through consultation, and although direct complaints from the iwi have been made, monitoring is still inadequate when it comes to keep the water clean:

Anna: Do you think the regulations here are stronger compared to other countries and that is why accidents haven't happened yet?

Robina: Ehm… I don't think the laws are strong enough. I don't think their bylaws are strong enough. Their monitoring isn't strong enough. We had an incident. Our *wai* (water), in Oakura, has changed so much just in the last 30 years. And the change is about the pollution and about the draw off. And we were part of our relationships with the local council. We have an input when someone asks for a license to draw water from it. And we looked at their policies and they were happy to hand out their license for 17 years. And we had a meeting with them at our Marae and we wanted to understand. Okay so. This farmer wants to draw the water off. He hasn't been doing it yet but he is going to sell the farm and wants to have the ability to draw water off, so what are your measurements about whether he can or can't? And what is it based off? All they could talk about it is flow rates. The flow rate in winter is totally different than in summer. And it would have been summertime when they would be drawing off. So we needed to have that conversation. And as it turned out they were left with no doubt that we were going to fight it. We didn't actually want to be left that we would go ahead. We wanted to be modified. And they were modified And they went from 17 to 5 years. But when it comes to monitoring., how much water, they operate under a trust system, and they only get involved if there is a complaint. Doesn't work. Just doesn't work. A high trust monitoring system is different as far as I am concerned. We need to have people on the ground checking it properly. We have noticed such a difference. We were known as a food basket. Kids I would teach, we would bring them out there and they would throw a fish line and in less than five minutes they would have caught a fish. It is getting better now. Got a little bit better. But in terms of fish that we used to get, our traditional food… not good at all. When we got the draw off and then pollution. And the stock, the farmers.

[45]I will discuss these aspects in more detail in Chapter Seven: Activism through the mountains and the rivers: Community responses to oil and gas development, where I document the communities' responses to oil and gas developments through activism.

This feeling is shared as well by Abbie Jury, professional gardener who has felt deeply affected by the intensified presence of oil and gas companies in the area for the last decade. Along with her husband, they have been devolving their entire life to nurture their garden, one of the few inter-generational private gardens in New Zealand, which has been kept through seven decades, becoming a landmark in the changing landscape through time. Like Robina, Abbie vocalizes to me the lack of proper monitoring of the drilling activities:

Abbie: If it is self-monitoring and self-reporting, what difference does it make? Because not all companies are equal of course. I may criticize Todd for many things as they are not as honest as they could be. But they do operate generally speaking in a fairly safe manner. Greymouth never did. And I have instances with Greymouth Petroleum where staff told me...The driller from Greymouth came here to see the garden. And he said I am deviation drilling. "but Todd said they would never do that". "Oh no I am deviation drilling. I am the driller" Oh that's really interesting. Someone else phoned me and he just started to talk to me. Greymouth was operating, they didn't have a number of certified staff...and they were operating really illegally. He would not give his name and number. And then the power line cut. I thought they probably cut him off. I think what happened with Greymouth. How many sites: about 10 well sites, 11… all consented for 8 well site production facilities. Council always consent for the max. We asked in public once "why are you giving well consented 700 meters apart?" And you have to drill within 5 years to activate consent. But Council had these consents with no expiring dates. The latest have. Up to that date, they didn't! The woman from Greymouth said it is "Future proofing the company". What is future proofing the company? It means they were building an asset of multiple well sites. Opening the consents. And I think that is coming out and they are going to sue the government. Over this decision. And I am sure they hoped to hook it off. Making capital gains and selling assets. /.../Taranaki is one of the most densely populated rural areas. And the regulations. And council regulations would not fit the purpose. And Todd bought their way. Have you been to that center? You know what it is? It is the extension of the art gallery. And at the time we were still on the guest list. We were invited to the opening and the prime minister was John Key up the McKee production station. And it was attended, well catered, and we got pens gifted, and was attended by all the local mayors, councillors and heads of business, prime minister, local MPs. And… At the same time people who were present there were involved in putting application consents for wellsites and so on. And they all went through. Todd Energy gave New Plymouth the centre and in return they gave him consents. It was pretty clear. And it worked. And they gotta do what they wanted. It is how it was.

I interviewed Dr. Blue, equine veterinary doctor and academic researcher, a few days after the Christchurch massacre[46], an event that shocked the entire country, leaving many with a heavy heart. A few of my interviewees blamed the massacre on lax regulations and laws, and they critically paralleled this laxity to the lax regulations governing the petrochemical industry. As Dr. Blue points to me, stricter rules are needed to prevent irreparable situations. When it comes to monitoring the practice of oil and gas companies, a possible solution we both discussed is the creation of a national body regulator rather than the division between regional and district councils:

> I will question whether regulations are strong. This is a gentle benign country, despite what just happened but our rules tend to be slack, and nothing really happens. They get away with this ehm benignal authority as no one is incarcerated for 50 years or anything like that. You have control from the small clubs at the top. Gun law is a classic in this. I mean you could...any idiot working in an office in town can get a gun license and get a military style rifle. And hopefully that stops. As a collector! People don't need to know anything about it and get it as a collector! I have always been appalled. Our rules are almost like that and quite an innocent and naive country. And lucky! Because we have this…That we don't see troubles like in other countries. And even this business with some bloody Aussie. I don't consider him a terrorist. But a bloody nutcase. Just prosecute him under the Crown Acts. He is where he belongs, he is an idiot.I don't know if a national body regulator would work… it is a small country. How do you put together...I am not sure. It will help. What it is left of a region like this that thinks they depend on oil, they get away with murder. So if we had another region that would help. It will give a better representation. They are all cheering for oil people in this place. All my neighbors, or most of them are. Dairy farms you can buy them for nothing. /.../ I wouldn't give anything to the oil and gas companies even if they offered me a million dollars!

The Parliamentary Commissioner for the Environment (PCE) had indicated the need of a national policy statement and create in this way a more solid support network for regional and district councils:

> The first recommendation is for guidance and direction from the Government in the form of a national policy statement, paying particular attention to unconventional oil and gas. While extrapolation from Taranaki is not adequate, it makes no sense for various councils to all be 'reinventing the wheel'… The Government therefore has an **obligation to support, guide, and where necessary direct, councils on how they need to prepare for and manage what could be a very rapidly growing industry. The challenges are nationally significant**. And it is unfair and inefficient to leave councils to each work out

[46] On March 15, 2019 two mass shootings occurred at mosques in a terrorist attack in Christchurch, New Zealand, shocking the entire country.

> their own response to this situation, especially when many have much more immediate and pressing issues to deal with. **Most councils are unprepared for expansion of the oil and gas industry. Rules in plans are generally inadequate, and often vary widely without justification. Conditions in consents are similarly variable. This does nothing to reassure those who are concerned about the industry. When those who live near wells discover that different rules and conditions apply in the next district for no discernable reason, they cannot help but wonder which, if any, are 'best practice' [added emphasis]** (PCE 2014:75)

As reported by Environment Foundation (2018), PCE is "an Officer of Parliament, independent of the government of the day". The individual assigned to this role reports directly to the Parliament and it is separate from the Ministry for the Environment. Established through the Environment Act of 1986, "[t]he PCE's job is to hold the Government to account for its environmental policies and actions. It is an independent check on the capability of the New Zealand system of environmental management and the performance of public authorities in maintaining and improving the quality of the environment" (Environment Foundation 2018: n.d).The PCE can investigate and report on any issue where, in their view, the environment has been or may be adversely affected. Through its investigation, the PCE can make recommendations, which however, don't become "binding rulings and nor can she reverse decisions made by public authorities" (Environment Foundation 2018: n.d.).

A point that Sarah stresses to me in our conversation, asserting how through the initial report she felt there was hope that some action would be taken to resolve the issues around the consent applications and regulations within Taranaki. Unfortunately, though the results have been slow and far from optimistic:

> Sarah: The PCE report came through and indicated this. It said that they weren't doing any inspections that they would alert anyone of any issue, they said about the need of a national policy statement that directed the whole country. As to how they should approach it. And we were very pleased with that. And they said the Taranaki Regional Council needed to review their regional policy statement to do with oil and gas. And the discharges. They said "all regional councils" because it was in other areas as well. But the TRC needed to do that as well. And so they found in our favor. They showed that they needed to be something done. I thought "Yahoo! Something is going to happen". But I felt I could breathe a sigh of relief. Because what I was saying visually I could see in the paperwork and what I was hearing was that eventually, I found its way into being a set of rules and policies that would help people living close to it. I was relieved because the regional council would do something about it. Because they had to publicly notify their policy statement. And people like myself could engage with that. And feel like we had a process we could make sure that it was safer. And then. A couple of things

happened. I was interviewed by MBIE. And I advocated for it. And it was one of the many recommendations but it was the biggest recommendation and no action was taken on that. And then the TRC, said they would not. Work on theirs until ...that was 2014, they were going to redo it within a couple of years and then said they weren't redoing it until the 2020s.

Anna: Because those are recommendations and not…

Sarah: They are not legal. But PCE is the independent watchdog of the government at the day. She made those recommendations and they decided not to follow them. And there was nothing at the point that someone like me could do about it. What can you do. They were still ramping up. They were still going ahead on what they were doing. Approaching it exactly the same way. And at that point there was something that happened that made this untenable for me to put it aside. Because at that point I might have said "I just have to wait until I have the opportunity to do that. Cause at the time I thought that it was...not inconvenient, but I had no process of understanding how risky and dangerous it was, to actually visualize it, until I asked for...

The environmental impacts brought to the surrounding areas can nonetheless have long-term effects on families and communities, reshaping, as Willow and Wylie stress "the social fabric" (2014: 227) of entire regions. In recent years, companies have intensified regulations through the application of more specific standards ranging from the well construction to transportation of discharge fluids, in a way to reduce impacts on communities and families. The regulatory framework however is never static but always changing and hopefully improving, as experts worldwide gather more information about the risks and impacts of fracking. Meanwhile, these circumstances can feel daunting and create a fear of uncertainty and distrust toward the government and industry (Willow 2014; Sangaramoorthy et al. 2016), due often to a lack of transparency in releasing information related to the practice itself. In New Zealand, district councils are responsible for managing how the oil and gas industry manages impacts with the land, including noise, light, from flaring gas, and disturbance from heavy traffic, while regional councils are responsible for water and air quality. As many interviewees pointed out to me, this task division has led often to confusion as to whom to reach out in case of problems occurring that need to be reported.

Being aware of the potential risks associated with their activities, companies in the mining sector have adopted practices to mitigate their presence through sponsorships of events, infrastructures, and schools. This practice is called social license to operate (SLO), and as Gunningham et al. (2004:307) asserts, it "governs the extent to which a corporation is constrained to meet societal expectations and avoid activities that societies (or influential elements within

them) deem unacceptable, whether or not those expectations are embodied in law." In mining communities and regions, the social license to operate has enabled companies to become particularly influential governance actors. Driving through the regions I noticed words such as "proudly sponsored by…", "thank you for the support from: ...", on school signs, natural sanctuaries, aquatic facilities, and WOMAD, a renowned international arts festival held every summer (in early March), sponsored for years by Shell Ltd. and Todd Energy, and now joined by OMV as well. In 2020, more than 5,000 people signed a petition created by a coalition of grassroot groups and Greenpeace to boycott and stop oil and gas companies from sponsoring the festival (CJT 2020).

As Emily Bailey, Climate Justice Taranaki spokesperson stated:

> Essentially sponsoring community projects is cheap advertising for these unethical companies who need to buy their social license. If they truly just want to support community initiatives then they can do it without plastering the company logo everywhere (CJT 2020:1).


*Figure 26: Tikorangi school sign and Greymouth Petroleum.* [47] *Image from Google Maps. Image Capture: January 2014*

This is a point that David raised to me as well in our conversation. A former farmer, forced to leave his farm due to the numerous impacts and struggles his family faced due to the vicinity of wellsites and oil rigs, along with his wife Sarah, he has helped to bring an awareness of the possible impacts of fracking and what the oil and gas companies can or cannot ask you to do in prospect of exploration or drilling. He had hoped for his son to continue the family business. In his tone of voice, I can hear the frustration and anger still present and motivating him to do the right thing for him, his family, and the community:

> There is nothing good about oil and gas companies. They are only here for the money. Supporting schools, like in Tikorangi, or so on. Stratford golf club. That's their. You know "peace money" so that they can ehm… you know... they are part of the crap they

[47] With the Covid-19 outbreak, complications occurred for me in regard to scheduling follow-ups and asking my contacts to help in capturing specific landmarks, signs, or locations I missed during my fieldwork. I was able to retrieve an image of the sign in Figure 26 through Google Maps, after I had first reported in my fieldwork notes in late November 2017 and later in February 2019.

> do. They are not for the community at all. They are in for the money. And that was brought out in hearings for the Council. The executives would say "we are here for the long run, we want to be good neighbours" and then as soon as the job ends, they fuck off, you know. They don't care about us.

Dr. M. Blue recalled for me his personal experience with companies wanting to buy his property to explore the possibility of expanding their current wellsite. He told me about how, though he was familiar with some of the sponsorships created by the companies, he didn't imagine the extent of these:

> I knew they sponsored races, horse races which interests me. But, I wasn't aware how far the quid pro quo went. They were touching everything. "Oh no the oil companies are good they helped us build this bar. This rugby club." You couldn't get anybody to act on principle as money polluted everything.

Similarly, as another resident reported to me, you start not to believe on the information you receive from regulatory bodies and companies, and you begin to fear their activities possibly destroying the area you live:

D.F.: I feel a sense of helplessness. I mean it hasn't happened throughout here. But what if? We are distrustful of these big companies that come in. I wouldn't trust them. I don't believe them. And certainly, with TTR[48] and that has been our experience. They would tell you what you want to know and not really. It is not the truth. They told us that the area around there that they were going to go and mine was like a desert. Luckily, we had a dive club that goes out there and it is absolutely full of fish. Coral and it is a living breathing habitat. And if they go through it. They are going to destroy it. They are going to destroy our mussels, and they are going to destroy them. How would you believe these people? They spend a lot of money trying to tell everything is black and white.

Talking with my interviewees near the New Plymouth District area, many pointed out to me their worries about the vicinity of well sites and production stations to schools. As reported

[48] Trans-Tasman Resources (TTR) is a mining company that has proposed to excavate up to 50 million tonnes of sand each year to separate iron ore from the sediment off the South Taranaki Coast. While initially it seemed the project would be approved, in October 2020 the Court of Appeal decided to stop the plan due to "multiple mistakes … made at the decision-making committee level of the Environmental Protection Authority (EPA)" (Pullar-Strecker 2020). In November 2020, the Supreme Court scheduled a three-day hearing, stating that it "could not rule out the possibility that a more limited application on different terms might be acceptable, so it referred the case back to be reconsidered" (Pullar-Strecker 2020). Opponents to the project, from environmental activists to iwi have expressed their concerns that "the sediment returned to the sea, and the noise of mining activity, will badly affect marine mammals and other creatures" (Pullar-Strecker 2020).

on *Taranaki Daily News*, in 2014, parents and educators in Inglewood raised a series of concerns on drilling and exploration consents granted to Tag Oil to start operations 700 metres distant from Norfolk's school grounds. The school's board of trustees expressed its consternation on the possibility of increased traffic, spillages, and emergency situations and engaged in a conversation with the student's parents to better grasp what action to take. Interviewed in the Taranaki Daily News, Principal Elder stated how the main goal is to prevent any possible damage to the kids:

> We have something unique here and we want to protect it, that's why the board has been so proactive on it. (Harvey 2014:n.d.)

In my conversation with Fiona, artist, photographer and environmental activist in one of the areas of the region where oil and gas production is more intense, she expressed to me her concerns about the vicinity of schools to well sites, how the strategy used by companies is that one of considering the surrounding farms and residential houses as 'neighbours'. Fiona. tells me how the impacts the industry has had in shaping prospective careers and the future of younger generations. Pointing out at the changes in the landscape, she states:

> They say they are being neighbors. But my neighbors were bringing the cattle and they would let me know. But they don't. And they are not always accurate when they say what the environmental effects will be. And I see us as the sacrifice zone. We have been living in this area. We are the sacrifice zone. All the sponsorship in New Plymouth. It is still a poor area. They don't have...if you look at the schools. The population at the school. The children are relatively poor. Or people are finding it hard to find accommodation, housing, and jobs. And the benefits for them aren't many unless you join the industry. But they industry...they don't. They don't see a real social responsibility.

When questioning directly staff members of oil and gas companies and individuals working in the industry, they stressed how transparency and openness on what happens around their operations has improved throughout the years and become a priority. However, as the head of the public relation office and an environmental engineer and project manager employed at one of the leading companies in the area pointed out to me, they can't feel responsible or know how other companies may choose to operate in the area and consequently engage with communities living around the wellsites:

I: We don't like to talk about other companies…but we like to... in our operations it is important to be open and transparent. We feel that the only way to operate... you know we are owned by a New Zealand family, who take their reputation and presence in New Zealand very seriously and so we are here representing them, we have...we all live in this environment, we have families here and, in our conscience, we want to do the right

thing. So... it's not... in any industry there are good operators and bad operators. But for us, we have two field. We are all working for Todd, we want to do it the right way, and as said, if you are committed to do the right thing by people, and you walk the talk, people can be okay with what you are doing as long as you are looking after them and doing things properly. It is only when you start to do things that people can't trust, they can't feel that openness and transparency, that it becomes tough for you and it becomes challenging by the community. Certainly, in our practice, we aim to make sure that we have good community relations and we do what people are sure they can trust us.

I2: And with the community-based legislation New Zealand lives with, you've got your commitment to promises and consents issues but Todd goes above that and if we just try to stick to resource consents things might be tricky

I: Hmm, definitely

As the Parliamentary Commissioner for the Environment presented in two interim reports related to fracking operations and the oil and gas industry, the social license to operate in New Zealand, in particular in the Taranaki region has not been fully earned by companies:

> Concerns about fracking are many and wide-ranging. They include the potential for contamination of important aquifers, triggering earthquakes, whether regulators have the capacity to deal adequately with concerns, as well as the impact on climate change. The concerns are not just environmental; some are questioning to whom and where the economic benefit will accrue. Increasing public understanding of the technology should help address some concerns. There may well be some changes in public engagement that could help – for example, combining regional council and district council hearings on applications for resource consents. But ultimately what is needed is trust – trust that government oversight is occurring, and that regulation is not just adequate but enforced, and seen to be so. (PCE 2012: 77)

The PCE stressed the warning given by The International Energy Agency Chief Economist Birol "if this new industry is to prosper, it needs to earn and maintain its social licence to operate" (IEA 2012a: n.d.). In 2012, the IEA released a special report on unconventional gas, called Golden Rules for a Golden Age of Gas, which included an in-depth analysis of hydraulic fracturing processes and activities. These rules have the purpose to assist regulators, policymakers, and operators in creating practices that are socially and environmentally responsible, with the final goal "to achieve a level of environmental performance and public acceptance that can earn the industry a "social licence to operate" within a given jurisdiction. The table below groups the 7 rules created:

| **Key rules** | |
|---|---|
| **Measure, disclose and engage** | • Integrate engagement with local communities, residents and other stakeholders into each phase of a development starting prior to exploration.<br>• Provide sufficient opportunity for comment on plans, operations and performance; listen to concerns and respond appropriately and promptly.<br>• Establish baselines for key environmental indicators, such as groundwater quality, prior to commencing activity, with continued monitoring during operations<br>• Measure and disclose operational data on water use, on the volumes and characteristics of wastewater and on methane and other air emissions, alongside full, mandatory disclosure of fracturing fluid additives and volumes.<br>• Minimize disruption during operations, taking a broad view of social and environmental responsibilities, and ensure that economic benefits are also felt by local communities. |
| **Watch where you drill** | • Choose well sites so as to minimize impacts on the local community, heritage, existing land use, individual livelihoods and ecology.<br>• Properly survey the geology of the area to make smart decisions about where to drill and where to hydraulically fracture: assess the risk that deep faults or other geological features could generate earthquakes or permit fluids to pass between geological strata.<br>• Monitor to ensure that hydraulic fractures do not extend beyond the gas producing formations. |

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|---|---|
| **Isolate wells and prevent leaks** | • Put in place robust rules on well design, construction, cementing and integrity testing as part of a general performance standard that gas bearing formations must be completely isolated from other strata penetrated by the well, in particular freshwater aquifers.<br>• Consider appropriate minimum-depth limitations on hydraulic fracturing to underpin public confidence that this operation takes place only well away from the water table.<br>• Take action to prevent and contain surface spills and leaks from wells, and to ensure that any waste fluids and solids are disposed of properly. |
| **Treat water responsibly** | • Reduce freshwater use by improving operational efficiency; reuse or recycle, wherever practicable, to reduce the burden on local water resources.<br>• Store and dispose of produced and waste water safely.<br>• Minimise use of chemical additives and promote the development and use of more environmentally benign alternatives. |
| **Eliminate venting, minimize flaring and other emissions** | • Target zero venting and minimal flaring of natural gas during well completion and seek to reduce fugitive and vented greenhouse-gas emissions during the entire productive life of a well.<br>• Minimize air pollution from vehicles, drilling rig engines, pump engines and compressors |
| **Be ready to think big** | • Seek opportunities for realising the economies of scale and co-ordinated development of local infrastructure that can reduce environmental impacts.<br>• Take into account the cumulative and regional effects of multiple drilling, production and delivery activities on the environment, notably on water use and disposal, land use, air quality, traffic and noise. |

| | |
|---|---|
| **Ensure a consistently high level of environmental performance** | • Ensure that anticipated levels of unconventional gas output are matched by commensurate resources and political backing for robust regulatory regimes at the appropriate levels, sufficient permitting and compliance staff, and reliable public information.<br>• Find an appropriate balance in policy-making between prescriptive regulation and performance based regulation in order to guarantee high operational standards while also promoting innovation and technological improvement.<br>• Ensure that emergency response plans are robust and match the scale of risk.<br>• Pursue continuous improvement of regulations and operating practices.<br>• Recognise the case for independent evaluation and verification of environmental performance. |

*Table 7: "Golden key rules".*

Re-adapted from: International Energy Agency 2012b. Golden Rules Report., 13-14. Retrieved from: https://www.gov.nl.ca/iet/files/energy-pdf-nl-hydraulic-fracturing-pt1.pdf

## Chapter Conclusion

In this chapter, I outlined the regulations of hydraulic fracturing in New Zealand, offering a brief historical background on the oil and gas presence in the country with a focus in Taranaki, and the economic changes the petrochemical industry has brought to the region throughout the 'Think Big' years. I discussed recently introduced policies to bring changes in the current legislation and discussed revisions to the Resource Management Act (RMA), a fundamental statute in oil and gas regulations. I have also highlighted some of the controversies that have risen through the years concerning Māori involvement in decision-making processes.

As Laura Nader (1982:104) observed nearly four decades ago "[t]he energy problem is not a technological problem … it's a social problem." Willow and Wylie (2014:232) stress this point as well, asserting that this contribution is needed "not only to [enrich] our collective knowledge about humanity and the world we share but also to [construct] ways of envisioning

and enacting a positive future." Anthropological engagement with hydraulic fracturing is relatively new among social science researchers; a rich body of ethnographic data documenting the socio-cultural impacts is slowly being developed by researchers around the world. Anthropological accounts of fracking are limited, but steadily growing (see De Rijike 2017; Perry 2012; Willow and Wylie 2014). Willow and Wylie (2014:230) emphasize that through "rich ethnographic narratives, the intensely stressful nature of the fracking process as well as the ongoing fear, uncertainty, and confusion it causes are made tangible." Rapid technological change and physical environment transformation have affected social relationships, thereby making it essential for anthropologists to connect and make sense of these dynamics, particularly in regard to the now commonplace notion that people understand the environment (Willow and Wylie 2014).

The loss or modification of certain land features can deeply impact a community's sense of belonging, leading to a loss of connection with the land and an experience of detachment or deterritorialization from one's own landscape. If a particular landscape feature is lost, the memories and stories linked to that particular rock, tree, or river could be modified or lost as well. As Ailsa Smith (2004) mentions in her article in relation to Taranaki iwi, the feeling of place is an element that perpetually shines through Māori stories and traditions. Stories that are inspired by "[t]he landforms of their local territory" and that have been "carried forward into the future, or [that have] influenced those that had informed them in the past" (Smith 2004:13).

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# CHAPTER SIX: RISKS AND UNCERTAINTY

Environmental issues are complex and form a crucial part of the history of contemporary society. The concept of risk regarding environmental issues may be observed through multiple points of view: political, economic, ecological, ethical, legal, historical, and cultural. In each of these perspectives, the need for a collaborative approach between different knowledge sources is essential, given the urgency of facing problems that radically affect the relationships between society and science. As it is conceptualized in the social science literature, risk derives from the relationship between the damage that could result from an event and the probability that such an event will occur. Risks are lived and experienced by individuals through actions and understandings within a specific group, community, or society. Risks are "informed by socially and culturally structured conceptions and evaluations about the world, what it looks like, what it should be or should not be" (Asa Boholm 1998:135-136).

We tend to perceive events and phenomena through a series of values. These values are shaped during our upbringing and in our practices and conventions in the society we grew up in (Boholm 1998). Joshua Reno (2011:518) investigates the "neglected spatiality of uncertainty, or more precisely, the way knowledge claims manifest as evidence of place" on a large landfill in Michigan, United States, and the leaking of contaminants into its surroundings. Reno offers a counterpoint to the risk literature by focusing on the production and circulation of evidence and environmental claims rather than on the perception and misperceptions of danger (Reno 2011:517). His approach is not to dismiss risk, but to go beyond the risk discourse which, according to him, "is motivated by its gaps and silences, particularly with regard to the lived, experiential aspects of dwelling in and representing one's surroundings" (Reno 2011:518). Reno's focus is on evidence, which comes with its own complications. However, unlike risk, evidence

> forces consideration of how claims are made, by what means they are justified, shared, and refuted, rather than beginning with the purported illusions and uncertainties of troubled subjects. From this perspective, risk calculations are only one type of evidentiary form in circulation among others. In particular […] I suggest that, in many cases, evidentiary disputes that fall under the category of "risk" are encompassed by broader sets of judgments about and care for places (Reno 2011: 517).

In my study, I considered a similar approach to that of Reno, by looking at risk as a catalog of the experiences and concerns presented to my participants as well as the scientific studies available on the impacts associated with hydraulic fracturing. In my analysis, I do not dismiss the notion of risk or how the concept influences the way individuals characterize and talk about the impacts and uncertainties of their surrounding environment. For this reason, I engage with the literature on risk by considering historic approaches to the study of risk.

During my visits to communities and areas close to fracking operations in Taranaki, I observed the risks and uncertainties experienced by those living near wellsites, production stations, and other fracking infrastructures.[49] In recent years, international evidence has pointed to the potential environmental consequences and health concerns that fracking communities have experienced during extractive operations. Concerned Health Professionals of New York (CHPNY) and Physicians for Social Responsibility (PSR) released several annual comprehensive compendiums delineating the risks and harms of hydraulic fracturing. Through compilations of studies and findings, physicians highlighted the risks of fracking fluids and waste to drinking water as well as the increased levels of noise, air pollution, and seismic activity caused by the extractive practice. The reports offer detailed lists of studies from around the world where hydraulic fracturing operations were linked to impacts on communities and environmental damage. The evidence of the risks and harms of fracking grows and is "augmented by increasing concern about the many remaining uncertainties, various countries, states, and municipalities have instituted bans and moratoria" (CHPNY and PSR 2019:13).

In my interviews, I often wrestled with the way the word risk was used differently, often in multiple ways in the same conversation. This struggle also arose in my transcription as I analytically approached the notion of risk. Several of my interviewees who identify themselves as experts in the oil and gas sector tended to back up their definition of risk with numbers, percentages, or statistics. Community members who have been experiencing uncertainty firsthand by not knowing whether the 'what-if' could become real sooner rather than later, showed an approach that could be defined as more emotionally driven. In my study, participants mainly referred to risk(s) in terms of environmental concerns and health impacts for themselves and future generations. I found it important to gather their narratives under the main categories of

[49] I discuss these experiences later in this chapter with the aim of connecting the concerns experienced by community members to the effects and impacts on their sense of place and belonging— themes that were often interlinked in my conversations with community members.

risks raised in conversation with my participants: water contamination, air pollution, noise and light pollution, and seismic activities.

Before presenting the interview narratives, I review the history of the study of risk and how the concept of risk has been discussed in anthropology and related fields. This theoretical framework aids in understanding the ways in which study participants analyze risk as well as how experts assess risk. In particular, I consider three theoretical approaches: the cultural/symbolic approach, the psychometric paradigm, and the risk society approach. For each theoretical position, I discuss key points and the identified criticisms. I then present the salient points that I found enlightening in grasping how my participants viewed and identified risk.

## A History on the Study of Risk

*Cultural symbolic approach and its contribution to risk perception.* Mary Douglas extensively explored the notion of risk, pointing out the need to consider cultural variability as a factor influencing the perception of what is dangerous. In *Purity and Danger,* Douglas (1966/1969) clarified the connection between morality and danger, which was for decades considered typically exclusive to what was in the teachings of an earlier time characterized as primitive societies, due to a lack of knowledge by the anthropologists. Beginning with an analysis of the cultural concept of pollution, Douglas developed a critique of the primitive/modern that helped dismantle this dichotomy. The "primitive" (pre-modern) mentality was described as characterized by a mentality where misfortunes derive exclusively from the action of spiritual beings (extra-human entities, divinities, spirits, etc.). The modern mentality would be to objectively trace and rationalize the material causes of specific effects through the application of scientific knowledge and the experimental method. According to the false dichotomy dismantled by Douglas, "primitives" are seen as such because they interpret disaster as an event caused by the anger of some divinity; while "moderns" are such precisely because they know and therefore explain disastrous events as a physical phenomenon deriving from laws that can be determined by science. This dichotomy of typically evolutionist origin, as Douglas discussed, outlined a clear contrast between belief and knowledge—or rather an irreconcilable dispute between two complex ways of representing the world. One view, typically held by those that were wrongly characterized as primitives, generates essentially false beliefs and knowledge about the world; the other view, typically attributed to those seen as moderns, generates a completely true and

definitive scientific knowledge of reality.

> [e]ach culture has its special risks and problems. To which particular bodily margins its beliefs attribute power depends on what situation the body is mirroring. It seems that our deepest fears and desires take expression with a kind of witty aptness. To understand bodily pollution we should try to argue back from the known dangers of society to the known selection of bodily themes and try to recognize what appositeness is there. (Douglas 1966:122-123)

In discussing taboos, Douglas (1992:3) stresses that "taboo turns out not to be incomprehensible but an intelligible concern to protect society from behavior that will wreck it. When miscreants are accused of spoiling the weather, killing with lighting, or causing storms at seas it is not a flaw in the reasoning process that should interest us, but something about casting blame."

To determine the perception of risk, Douglas asserted the importance of knowing the general cultural context of each society and how communities react when facing certain situations or things that are considered dangerous. Risk is something real and concrete, but its perception depends on the cultural context through which each community manages it. An individual has a choice to be aware or not aware of a particular risk and how the societal background has framed the risk and responses to it. In *Risk and Culture* (1982) Douglas and Wildavsky define a cultural theory of risk, developed as "a neutral instrument where the morphology of societies could be compared irrespectively of their existence intime and space" (Oltedal, Moen, Klempe, and Rundmo 2004:5). Douglas emphasizes the cultural approach:

> [a] cultural approach can make us see how community consensus relates some natural dangers to moral defects. According to this argument, dangers are elected for public concern according to the strength and direction of social criticism … Our guiding assumptions are that any form of society produces its own selected view of the natural environment, a view which influences its choice of dangers worth attention. Attribution of responsibility for natural disasters is a normal strategy for protecting a particular set of values belonging to a particular way of life. Consequently, research into risk perception based on a cultural model would try to discover what different characteristics of social life elicit different responses to danger. (Douglas and Wildavsky1982:7-8)

The concept of risk emerges as a key idea due to its applicability as a forensic resource, helping quantify the degree of danger and the steps/policies that can be created to prevent negative events: "[r]isk is the probability of an event combined with the magnitude of the losses and gains that will entail. However, our political discourse debases the word. From a complex attempt to reduce uncertainty it has become a decorative flourish on the word 'danger'." (Douglas 1992:40).

A problem occurs when one tries to formulate a universal approach and interpretation of risk. Is there a universal, correct, and objective perspective to be followed?

> To ask which is the correct description of rational behavior (that is, to ask what the real risks are) leads to an answer which finds irrational bias and misperceptions of real interest in the viewpoint of anyone who disagrees. Instead, cultural analysis shows how a given cluster of values and beliefs makes sense out of the various positions people take and the practices they employ. To what believes and values would members of society most readily refer in order for that kind of society to have credible, coherent institutions? (Douglas and Wildavsky 1982: 9)

In the 1950s and 1960s, as Douglas and Wildavsky (1982) point out, widespread technological optimism characterized by confidence toward new forms of energy such as low-cost nuclear power and the growth of the chemical industry made it seem that science and technology had forever dissolved the link between morality and danger. Chauncey Starr (1969) was among the first to conduct scientific studies on risk perception. His research aimed to establish a procedure that would allow any society to calculate the acceptable level of technological risk based on the resulting social benefits. This new approach gave rise to original concepts, which fit specifically into the nascent sub-discipline. Starr's key concepts are:

- limits of risk acceptability
- natural levels of risks
- the differentiation between risks that are taken voluntary versus involuntary and the various implications they have on the political level
- the distinction between chronic and catastrophic risks [50]

Douglas and Wildavsky (1982) critically analyze Starr's ideas concerning the method of risks and rewards. Starr's work was explicitly influenced by economic theories and its main purpose is to show that anything that can be tolerated can be considered a result of a distribution of risks accepted, knowingly or not, among members of a community. "Chauncey Starr claims to provide an objective tool for measuring the expected dangers against the expected benefits of new technology, thus enabling cool, politically neutral decisions to be made and, better still, to be justified before the legislature" (Douglas and Wildavsky 1982:17). In their analysis, Douglas and

[50] Starr's attempt in the late 1960s, although inconclusive, opened up a series of research programs in this area. A series of studies developed and gave rise to the so-called psychometric paradigm.

Wildavsky describe the key for this approach as control; political involvement in deciding whether a situation or activity can be risky:

> [t]he key word is control: who is to control whom in regard to which aspects of life? There are always unsuspected dangers. Always some inventions (asbestos, X rays), introduced to make something safer, turn out to be dangerous. Always dangers that are present are ignored. Since anything and everything one does might prove risky … we should ask why we face some unknown risks gladly and bristle at others. There is always a government, which seeks to protect citizens against dangers with which they could not cope alone […] Chauncey Starr suggests that it would significantly limit regulation if, drawing the line around involuntary risk, the individuals were freely allowed to incur danger that threatens only himself. But there is practically nothing that the individual does in leisure time that does not affect his children or others who enter the home or even those who provide or share his sports. (Douglas and Wildavsky 1982:19-20)

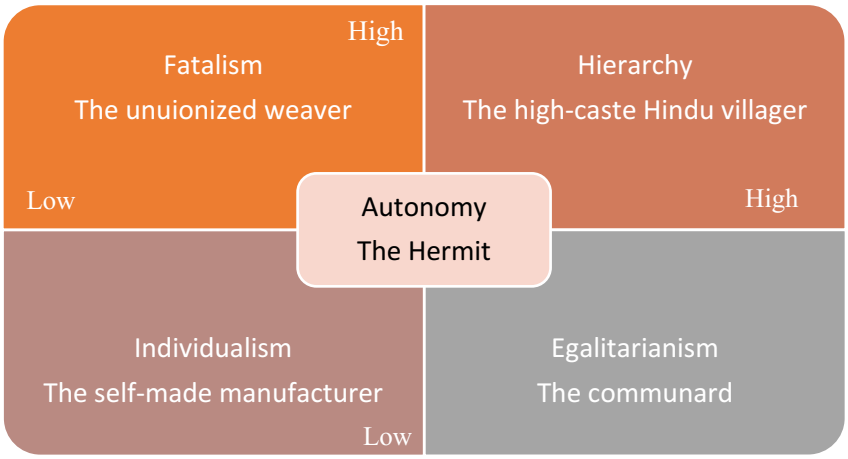
The cultural/symbolic approach to risk has tried to focus on the social factors that define the differences between people in their reactions to risk. With this approach, the aim is to show how risk perception, recognition, and management are intimately connected and filtered by the specific culture, symbolic horizon, and social organization within which people move. Risk perception occurs not only at the individual level but occurs above all at the collective level, presenting itself as a culturally standardized response (Douglas 1992). Douglas and Wildavsky (1982) identify the Grid-Group Model which defines four distinct groups with four related views to risk:

- The hierarchical groups respect the authorities, comply with the group norms, share their forecasts regarding risks and trust the established organizations;
- the Egalitarian groups are made up of individuals who strongly identify with their group, attribute risk responsibility to actors not belonging to the group itself, tend to be wary of externally imposed norms, and are in favor of a risk-based approach participation;
- Individualist groups, on the other hand, argue that everyone must face risk based on their criteria, they trust individuals more than organizations and argue that risk-taking can have both negative and positive consequences;
- Fatalists lack strong ties with the group, concerning risk they tend to sink to chance and fate and attribute little control over events. (Oltedal et al. 2004)

In addition to the four worldviews described, one group does not fit and corresponds to those people who "have cut all relations to their social environment and live more or less like 'hermits'" (Thompson et al 1990). The five worldviews, or ways of life, make up the central part

of the cultural theory: a person will choose to belong to a dimension, and this will guide his or her interaction with the environment.

The model proposed by Douglas and Wildavsky (1982) tends to be a static typology that does not recognize the fact that most people do not have a single conception of the world but adopt different ones according to the situations they find themselves in. However, the model is defined in ideal terms and its main purpose is a general categorization tool, describing the positions from which individuals, or individuals as members of cultures orient themselves towards risk:




Grid-Group diagram with the fifth cultural hero, 'the hermit', from the textbook written by Thompson, Ellis, and Wildavsky (1990:8)

Even with Douglas's contribution to the understanding of cultural and anthropological processes concerning the phenomenon of risk in societies, it is important to assert that some criticisms have been leveled at this theoretical-methodological approach. According to Oltedal et al. 2004, the theory presupposes not only a correspondence between "way of life" and individual orientation, but as well a meta-rationality in choosing between 'ways of life'":

> The mobility view of culture makes it possible to adhere to different cultures in different situations or parts of life. When people answer a questionnaire, which of the cultures determines their answers? If someone is hierarchical at home but individualistic at work, how will this be captured by a questionnaire that presupposes people to adhere to only one culture? (Oltedal et al. 2004:28)

Lupton (1999) proposed a review of the concepts of risk, placing them along a continuum characterized by a weaker or stronger social construction of the risk itself. Lupton (1999:14)

states that we need to consider that risks are predominantly grouped into six categories: environmental risks, lifestyle risks, health risks, interpersonal risks, economic risks, and criminal risks.

> [o]ur awareness and knowledge of these risks, and others, contribute to various aspects of subjectivity and social life, including how we live our everyday lives, how we distinguish ourselves and the social groups of which we are members from other individuals and groups, how we perceive and experience our bodies, how we spend our money and where we choose to live and work. Those phenomena that we single out and identify as 'risks', therefore, have an important ontological status in our understandings of selfhood and the social and material worlds. Societies—and within them, social institutions, social groups and individuals—need this selection process as part of their continued operation. Risk selection, and the activities associated with the management of risk, are central to ordering, function and individual and cultural identity. (Lupton 1999: 14-15)

Lupton (1999:26) asserts the important contribution the sociocultural perspective brought toward a complete understanding of risk, underlining how it has helped in "emphasiz[ing] the very aspects that cognitive science and other technical-scientific approaches have been criticized for neglecting: the social and cultural contexts in which risk is understood and negotiated." As Tansey and O'Riordan (1999: 88) point out, a cultural theory of risk can be help

> to identify the various strands of interest, explain how values and outlooks are shaped and connected, and enable facilitation of deliberation so that new frameworks of trust are built up. In other words, the controversial risk issues will remain unresolved until the emphasis is shifted from more substantive scientific research around illusory concepts such as' objective risks' toward better deliberative processes that create legitimate decision-making structures.

A middle ground between the objectivity of risk and the subjective vision of it would help in acknowledging that risks are neither simply objective nor subjective. In this, I agree with Boholm when she asserts the need to consider risk not as a phenomenon in itself:

> But as a cognitive frame that produces contexts which link an object of risk (a source of potential harm), an object at risk (a potential target of harm), and an evaluation (implicit or explicit) of human consequences. In this way, we can think of risk as a relational order through which connections between people, 'things' and 'outcomes' are constituted. (Boholm 2003: 175)

In my research concerning the risks experienced in relation to fracking, cultural theory helps to recenter the individual's vision towards the idea of risk. Often, oil and gas companies tend to identify risk through statistical studies and a scientific objectivity that can be distant and

detrimental for those individuals who are forced to accept living near well sites and production stations, witnessing changes in the landscape and experiencing impacts in their personal wellbeing and through their social connections. In a region such as Taranaki, it can be said there is stronger acceptance to risk due to the lengthy history of oil and gas in the province, compared to other areas in the rest of the country where potential oil and gas development have been halted through the intervention of residents and grassroot organization.[51] Nonetheless, my intent is not to state there is homogenized view of risk, as in every community there are different variations in the perception of risk. Depending on the ways of living one decides to adopt, one can have a different experience with the risk associated with fracking. The experience a farmer might have toward risk would be different from that of an oil rigger. While the latter, by accepting certain risks linked to the job, he/she may benefit economically from its employment within the industry, supporting the continuation of extraction to secure his/her living. The farmer may view the presence of the industry damaging his work and relationship with his land and lead him to perceive different risks linked to his emotional wellbeing and health. It must be said that not everyone who associated himself/herself to these two specific categories will experience the same perceptions of risk all the time. Views toward risk do not stay static but shift through times as well. Echoing what Boholm asserts, social relationships, cultural beliefs, trust in institutions and science, knowledge, practices and collective memories all shape notions about risk or safety (Boholm 2003: 175). Putting culture at the center allows to better situate risk and understand how this is created and negotiated.

*Psychometric paradigm and perception of risk.* The psychometric paradigm was developed by Slovic et al. (1978) in the late 1970s. Slovic and colleagues aimed to identify the mental strategies that ordinary citizens use to formulate judgments on risk (Slovic et al. 1984). Many of the researchers who adopt this approach believe there is no such thing as "real risk" or "objective risks", but risks can be exclusively interpreted as perceptions. As Slovic (1987) explained

> The psychometric paradigm encompasses a theoretical framework that assumes risk is subjectively defined by individuals who may be influenced by a wide array of psychological, social, institutional, and cultural factors. The paradigm assumes that, with appropriate design of survey instruments, many of these factors and their interrelationships

[51] I will discuss the involvement of grassroots organizations and resident's interventions against fracking in Chapter Seven.

can be quantified and modeled in order to illuminate the responses of individuals and their societies to the hazards that confront them.

In their research, Slovic et al. (1978) asked people to evaluate a series of risky events, and estimate the costs, benefits, and to judge the level of risk that they deemed acceptable. The study identified a series of variable risk characteristics that are linked to a specific impact on the coding processes and the resulting expected behavior. Researchers created a distinction between common and terrifying or chronic and catastrophic risks. The methodology consisted of asking individuals to evaluate a series of potential dangers according to the risk spectrum and characteristics such as personal control and the immediacy of the risk effect. From the intersection of these elements and the different types of dangers, researchers created a cognitive map of risks, indicating the mental representation that individuals have of each danger.

Research in this area shows that experts and laypeople apply different definitions of risk during the decision-making process, leading to diverse assessments of possible risk exposure. According to Slovic et al. (1978), experts base risk assessment on the number of expected fatal events while laypeople perceive the risk in a more complex way by integrating qualitative characteristics such as the voluntary or involuntary exposure to the risk or the immediacy or any linked effect.

What often occurs is a conflict between experts and citizens caused by differences in the representation of the risk and the technology in question. Among these differences it is possible to identify:

**Probability:** The probability that something will occur is often expressed in numerical form by experts; when the public receives the information, it transforms the probability into all or nothing. It follows that even very low probabilities can be perceived as certainty. For example, experts can state that a very serious event can happen with a probability of 0.1%; for the public, even such a low percentage is perceived as certain because it indicates that the event can happen.

**Emotions:** Experts evaluate risks based on scientific calculations, while people evaluate them based on the positive and negative emotions aroused by the risk itself

**Benefits:** For experts, the benefits and risks of technology are independent of each other; for ordinary people, benefits and risks are negatively correlated. If people rate the risks high, they will rate the benefits low and vice versa.

**Uncontrollability:** For experts, the risk of behavior does not depend on the person who carries it out, while for the public this factor is very important.

**Catastrophe:** People consider a catastrophic event that has thousands of victims at once more dangerous than events that have relatively few victims at the same time but happen frequently. For experts, however, the risks are equally dangerous and serious.

**Psychological numbing:** For the expert, every human life has the same value. For ordinary people if the victim can be identified with the name or with a photo, it has a greater psychological impact than when dealing with a generic victim. It seems that this effect is due to the empathy we often feel for people like us.

**Future generations:** If a technology puts children's lives at risk, this is perceived as riskier by ordinary people than a technology that will affect more adults.

**Voluntary exposure:** If the risk is imposed from the outside (such as pollution) it is perceived as intolerable and serious compared to a risk to which one is voluntarily exposed. (Slovic 1987)

A contribution of this approach is the understanding of a set of mental strategies, or heuristics that people use to "make sense out of an uncertain world" (Slovic 1993:3). According to the founders of the psychometric approach, ordinary people tend to overestimate or underestimate certain categories of risks: for example, they consider remote but exceptional events more probable, and underestimate family risks and voluntarily faced risks (Lupton 1999).

The main limitation however is considering risk assessment as an individual product and to neglect the role played by the social context in which a risk develops. Through this paradigm, as Lupton (1999) discusses, individuals are presented more as "information-processing unit", as emotion-free actors:

> People tend to be positioned outside the cultural and political frameworks, relationships and institutions within which they construct their beliefs and engage in behaviours. In such research, individuals are therefore represented as atomized and self interested, ideally behaving in response to their carefully considered calculations of risk as it affects them individually. (Lupton 1999: 24)

In the context of my research, the psychometric approach helps to grasp the contrast between expert/lay individual. Through the systematic categorization of risks a person is requested to put aside their emotional response to any event or situation they may see as risky. Industry experts

generally rationalize individuals' perceptions of risk, and when the emotion prevails over the response seen as the more rational one to adopt, they dismiss this reaction, by pointing how the cause of this type of response has to be found in a lack of knowledge and misinformation from the opposite side. As Thrift (2004) suggests, however risk can't be evaluated separately from an emotional response, as emotions are "a form of thinking, often indirect and non-reflective, it is true, but thinking all the same[,] a different type of intelligence about the world" (2004: 60). Often, in conversation with my interviewees, I struggled to grasp how one could rely exclusively on the understanding of risks through statistical data or survey models, and omit the socio-cultural context associated with the perception of risk. As I listened to those who have been impacted by fracking operations, their recollections, concerns, fears, and uncertainties stemmed through their experiences and reality.

*Risk Society approach.* Theorists adopting a 'risk society' perspective have shown a predominant interest in the reflexive process of modernization, criticizing its outcomes including individualization and the breaking down of traditional norms and values (Lupton 1999). Beck (1992) and Giddens (1998) are considered the two main exponents of this theory, despite there being many similarities and differences in their perspectives.

When Beck (1992:21) refers to risk society, he means "a systematic way of dealing with hazards and insecurities induced and introduced by modernisation itself." Beck identifies risk as the main element guiding modernity: the idea that the side effects and dangers produced by decisions are controllable. For Beck (1992:12) risks correspond to "irreversible threats to the life of plants, animals, and human beings." A risk is another word for hazard or danger, and risk originates when the confidence we placed in the safety of our condition fails, in any way whatsoever:

> Risk, as opposed to older dangers, are consequences that relate to the threatening force of modernization and its globalization of doubt. They are *politically reflexive.* (Beck 199:21)

Beck believes that we must start from a place of reflection on how risks and damage creep everywhere silently and independently of free choice: "[n]ow there exists a kind of *risk fate in developed civilization,* into which one is born, which one cannot escape with any amount of achievement, with the 'small difference' (that is the one with the big effect) that we are *all* confronted similarly by that fate" (Beck et al. 1992:41). Beck's thesis is that a social era has

opened in which the solidarity of anxiety becomes the force of politics, but at the same time warns:

> [t]o what extent can anxiety communities withstand stress? What motives and forces for action do they set in motion? Will the social power of anxiety break individual judgments of utility? How capable of compromise are anxiety-producing communities of danger? In what forms of action will they organize? Will anxiety drive people to irrationalism, extremism, or fanaticism? So far, anxiety has not been a foundation for rational action. Is this assumption no longer valid either? Is anxiety -- unlike material need-- perhaps a very shaky foundation for political movements? Can the community of anxiety perhaps even be blown apart by the weak draft of counter-information? (Beck 1992:49-50)

Solving these problems, however, does not appear easy. In Beck's (1994:14) theory, the concepts of individualization and reflexivity are central to his view of risk and reflexive modernization: "[individualization stands for] the disintegration of the certainties of industrial society as well as the compulsion to find and invent new certainties for oneself and others without them." Individualization becomes a requirement for individuals to follow "in the absence of fixed, obligatory and traditional norms and certainties and the emergence of new ways of life that are continually subject to change (Beck 1994:13, as cited in Lupton 1999:71). With modernization and the growth of uncertainty, individualization is strictly linked to fear:

> [t]he result is that social problems are increasingly perceived in terms of psychological dispositions: as personal inadequacies, guilt feelings, anxieties, conflicts, and neuroses. There emerges, paradoxically, a new immediacy of individual and society, a direct relation between crisis and sickness. Social crises appear as individual crises, which are no longer (or are only very indirectly) perceived in terms of their rootedness in the social realm. This is one of the explanations for the current revival of interest in psychology [Psychowe/le]. (Beck 1992:100)

The critique of scientific, economic, and political rationality constitutes the most mature expression of reflexivity and as such it can show the limits of each of these areas. In addition, the society of risk involves a necessary rethinking of "rationality, knowledge, and practice"(Beck 1992:71). As Burgess et al. (2018:4) assert, Beck's critical approach helps us to understand representations of risk and alternative frame analysis, and "uncover contextual factors that shape how and why risk judgments are made…" Furthermore, "[h]is refusal to accept ingrained traditions and his willingness to challenge the sociological orthodoxy enabled him to impress upon us the social significance of risk and to encourage researchers to think hard about what it tells us about the world we live in today" (Burgess et al. 2018:4). According to a risk society

approach, risks are seen as harder to be measured “because of their non-localized nature and potential long-term effects” (Lupton 1999: 65). Experts often contradict each other, through debates due to different knowledges, procedures and results, leading to a paralysis in the society, and bringing the lay individual to find himself in a whirl of confusion not knowing which information to listen to. Consequentially, as Beck argues, it is not uncommon that scientists lose their authority linked to risk assessments and their positions are challenged by political groups and activists (Beck 1995:125–6). As human knowledge grows, new uncertainties arise, and so perceptions of risk. Beck criticizes experts who position themselves above lay people, labelling them as ignorant, lacking the appropriate amount information to respond adequately to risk. Beck doesn’t directly accuse the individual scientist or expert, but the institutionalization and methodological approach sciences have toward risks:

> My thesis is that the origin of the critique of science and technology lies not in the 'irrationality' of the critics, but in the failure of technoscientific rationality in the face of growing risks and threats from civilization. This failure is not mere past, but acute present and threatening future. In fact it is only gradually becoming visible to its full extent. Nor is it the failure of individual scientists or disciplines; instead it is systematically grounded in the institutional and methodological approach of the sciences to risks. As they are constituted - with their overspecialized division of labor, their concentration on methodology and theory, their externally determined abstinence from practice - the sciences are entirely incapable of reacting adequately to civilizational risks, since they are prominently involved in the origin and growth of those very risks. Instead - sometimes with the clear conscience of 'pure scientific method', sometimes with increasing pangs of guilt - the sciences become the legitimating patrons of a global industrial pollution and contamination of air, water, foodstuffs, etc., as well as the related generalized sickness and death of plants, animals and people. (Beck et al.1992: 59)

Giddens’s (1998) focus on risk aligns with several elements in Beck’s ideas. For Giddens (1998:27), a risk society is “a society increasingly preoccupied with the future (and also with safety), which generates the notion of risk.” Giddens agrees with Beck in that modernity and industrialization have lowered the probability of certain risks while creating at the same time new uncertainties as well as changing habits and lifestyles. For the sociologist, “[m]odernity is a risk culture [meaning that] the concept of risk becomes fundamental to the way both lay actors and technical specialists organize the social world. Under conditions of modernity, the future is continually drawn into the present by means of the reflexive organization of knowledge environments” (1991:4). In “pre-modern cultures” (Giddens 1991) expert knowledge tends to “depend on procedures and symbolic forms that resist explicit codification; or, when such

knowledge is codified, it is unavailable to lay individuals because literacy is the jealously guarded monopoly of the few" (Giddens 1991:4). The accessibility of expert skills and information to people has impacted societies and the level of risk experienced. Lupton (1999:76) explains that Gidden's position on the nature of risk is like Beck "in relating it to hazards or dangers that exist objectively, [therefore] differ[ing] substantively from previous areas and … now linked to human responsibility." According to Giddens (1994:58-59), risk moves into two distinct stages: in the first stage risk is a precise calculation promoting certainty, "bringing the future under control." In the second stage we can't precisely calculate risk and we develop possible scenarios (Giddens 1994:58-59). Through the first stage of risk, the welfare state has developed a "means of protecting populations from the risk of actuarially calculable threats such as illness and unemployment with the use of social insurance schemes" (Lupton 1999:77).

For Beck and Giddens, modernity produces an increase in reflexivity, developing critical approaches to reality, discussions, evaluations, new choices, and possibilities for action. Modernity has transformed time and space along with mechanisms that have pushed us away from relying on pre-established practices, including traditional forms of knowledge and religious precepts. Modernity has also created doubt about the validity of knowledge and greater uncertainty: "[t]he fact that experts frequently disagree becomes familiar terrain for almost everyone" (Giddens 1994:186).

A point of difference between Giddens and Beck is the dominant notion of trust. Giddens sees trust as

> a crucial generic phenomenon of personality development as well as having distinctive and specific relevance to a world of disembedding mechanisms and abstract systems. In its generic manifestations, trust is directly linked to achieving an early sense of ontological security. (Giddens 1991:3)

Giddens (1991:28) refers to a form of faith in the competence, that is to say, the authenticity of expert knowledge in "which they apply–something which I cannot usually check exhaustively myself." Trust is bound up with contingency rather than with risk. Trust always carries the connotation of reliability in the face of contingent outcomes, whether these outcomes concern individual action or the operation of systems:

> In conditions of modernity, trust exists in the context of (a) the general awareness that human activity–including within this phrase the impact of technology upon the material world–is socially created, rather than given like things or by divine influence; (b) the vastly increased transformative scope of human action, brought about by the dynamic

> character of modern social institutions. The concept of risk replaces that of *fortuna*, but this is not because agents in pre-modern times could not distinguish between risk and danger. Rather it represents an alteration in the perception of determination and contingency, such that human moral imperatives, natural causes, and chance reign in place of religious cosmologies [....]. Risk and trust intertwine, trust normally serving to reduce or unlock the dangers to which particular types of activity are subject. There are some circumstances in which patterns of risk are institutionalized, within surrounding frameworks of trust (stock-market investment, physically dangerous sports). Here skill and chance are limiting factors upon risk, but normally risk is consciously calculated. In all trust settings, the acceptable risk falls under the heading of "weak inductive knowledge," and there is virtually always a balance between trust and the calculation of risk in this sense. What is seen as "acceptable" risk–the minimizing of danger–varies in different contexts, but is usually central in sustaining trust? Thus traveling by air might seem an inherently dangerous activity, given that aircraft appear to defy the laws of gravity. Those concerned with running airlines counter this by demonstrating statistically how low the risks of air travel are, as measured by the number of deaths per passenger mile. (Giddens 1991:14)

Despite the convergences between Beck and Giddens, the two theorists have a different representation of the expert knowledge system. Giddens sees reflexivity as occurring within expert systems and relying upon lay people's trust in expertise. On the other hand, Beck sees reflexivity as a critique of the expertise level "based not in trust but distrust of the expert systems, particularly in relation to environmental hazards" (Lupton 1999:84).

Denney (2006) critically analyzes risk society theory, underlining some of the most common criticisms of Beck's approach. A main criticism is that "it fails to take full cognisance of the complexities of specific risk situations" (Denny 2006:33). Like Giddens, Beck seems to assume that insecurity and fear of new forms of risks have replaced concerns about material poverty, inequalities, and discrimination:

> Risk societies are contingent in their origins, and variable in format. It is dangerous to regard the current risk-conscious condition as the inevitable result of historical logic … Risk is not experienced in the same way by different groups of people in the community. The idea of a risk society fails to take into consideration the subtle differences in the way people experience and explain the risk. 'Risk society' theories fail to capture the fluidity of risk, which is elusive and constantly changing its form. (Denney 2006:33)

Beck and Giddens approach to risk can be described to be focusing its attention "on how risk is generated and dealt with at the macro structural level of society, the political implications of this, and the social conflicts that arise" (Lupton 1999), preferring a weaker emphasis on the social and

cultural aspects of risk. A criticism put forward by Scott Lash (1993) and Deborah Lupton (1999) is that Beck's and Giddens' representation of modernity lack an acknowledgement of "the complexity of responses to expert knowledges" (Lupton 1999:85). Although this sociological approach to risk lacks diversity in cultural views, its discussion on how an increase of knowledge has led to an increase of fears and uncertainties resonates with what I captured through the conversations with several of my interviewees. Many of those who have been exposed to the wellsites and fracking activities made efforts to inform themselves and as they gathered more information became more anxious without at times being able to fully reconcile with their anxiety. At the same time, interviewees reported to me how the information they gathered often felt incomplete as they did not gain the full access to the scientific knowledge, owned as Beck (1992:53) would state, by 'external knowledge producers', at times limiting not only their ability to have a full picture of the risks involved with practice but as well as slowing down their actions against the oil and gas companies. The latter in response, as I later will discuss, often invoked commercial confidentiality issues for the release of specific information and the inability for non-experts to grasp the technical aspects related to fracking operations.

## Environmental and Health Concerns Associated with Hydraulic Fracturing

In several conversations with my interviewees, we discussed their fears when relating to potential environmental and health risks and issues caused by pollution from fracking. Many were distressed in not knowing if it would be possible to prevent being affected by the pollutants, and more importantly, how to protect their kids and grandkids. Others listed symptoms they have experienced since drilling operations started, including aggravating forms of asthma, respiratory and skin allergies, and more serious conditions. As the focus of my project was not to investigate health medical records and collect such sensitive data, I avoided more in-depth questions into their medical history. I instead limited myself to listening to their health problems as part of their narrative on the impacts on their sense of place and how they related to their landscape. Drawing on a background of current literature, this section outlines the common risks and concerns associated with hydraulic fracturing operations and presented to me by my participants. I will

illustrate scientific findings and reports by breaking the information into four sub-sections: water contamination, air pollution, noise and light pollution, and seismic activities[52].

*Water contamination.* As previously discussed, fracking for natural gas and oil requires copious amounts of water. The pressure and vibrations caused by the drilling and injection of chemicals into the ground can cause changes to groundwater quality in terms of color, odor, and turbidity (Groat and Grimshaw 2012). Substantial evidence has been collected worldwide, especially in North America, indicating that the "drilling and fracking activities, and associated wastewater disposal practices, inherently threaten groundwater and have polluted drinking water sources" (CHPNY and PSR 2019:68). In Texas, groundwater samples contained approximately 19 different fracking-related contaminants including cancer-causing benzene. In Pennsylvania, elevated levels of fracking fluids have been repeatedly found in drinking water wells near fracking operations. In California, "state regulators admitted that they had mistakenly allowed oil companies to inject drilling wastewater into aquifers containing clean, potable water" (CHPNY and PSR 2018:18).

Cooley and Donnelly (2012:17) explain that "[g]roundwater contamination from shale gas operations can occur through a variety of mechanisms. Natural gas is located at varying depths, often (but not always) far below underground sources of drinking water. [The] chemicals and natural gas can escape the well bore if it is not properly sealed and cased." Although there are several requirements and regulations for well casing and integrity, accidents and failure can still occur as was the case in Dimock, Pennsylvania. Located in Susquehanna County, in 2009 an explosion occurred in an outside drinking water well due to methane build up. The Pennsylvania Department of Environmental Protection (DEP) issued a notice of violation toward the drilling company, Cabot Oil and Gas, stating that it had "discharged natural gas into local waterways and failed to prevent natural gas from entering fresh groundwater" (PA DEP 2009)[as cited in Cooley and Donnelly 2012:18]. In an investigation, the DEP found methane contamination showing that Cabot Oil and Gas was not only responsible for polluting 13 drinking water wells, but also was violating regulations related to casing and excessive borehole pressure (PA DEP 2009). At the end of November 2009, DEP required the company to restore or replace water supplies for the affected families and to cease drilling, banning any fracking operations until further authorized.

[52] Structuring the chapter this way supports my future goal of converting sections of my thesis into a report for members of Taranaki communities, organizations, and others interested in the topic.

However, only two years later, in October 2011 the DEP determined that Cabot Oil and Gas had "fully complied with the consent order," (Cooley and Donnelly 2012:17), that there was no longer an obligation to provide drinking water to Dimock residents, and that the company could restore their activities. In December 2011, the EPA reported that water was safe to drink despite local community members still experiencing side effects due to methane contamination such as headaches, dizziness, and nausea. These events led the community to submit results of their own testing which indicated significant pollution in their water (McAllister and Gardner 2012). Cooley and Donnelly (2012:17) further explain that "the EPA began sampling water at approximately 60 homes in the area and supplying drinking water to four households that had shown elevated levels of contaminants that pose a health concern." The first round of independent testing supported the community members' concerns, as only 11 out of the 60 homes tested were considered to be free from harmful levels of contamination.

Fracking waste and discharge into streams have deeply impacted the environment, affecting aquatic biodiversity and sensitive fish species due to an increase in "downstream levels of radioactive elements, heavy metals, endocrine disruptors, toxic disinfection by-products, and acidity" (McQuarrie 2018). Concerned Health Professionals of New York (CHPNY) and Physicians for Social Responsibility (PSR) have reported significant changes in the bacterial flora in groundwater following fracking operations. According to Robert et al. (2018:39), "[c]hemicals associated with unconventional oil and gas (UOG) operations have been shown to contaminate surface and ground water with a variety of endocrine disrupting compounds." Their findings suggest that UOG-associated water pollutants at low—but environmentally relevant doses—have the potential to "induce acute alterations of immune function and antiviral immunity" in amphibians (Robet et al. 2018).

According to Forbes magazine, there are growing health and safety concerns with chemicals and potential water contamination (Stone 2017). Challenging the company practice of not disclosing information on the fracking fluids has resulted in almost total disclosure or at least the use of less toxic chemicals. Table 7 summarizes some of the health risks associated with the fracking fluid chemicals, describes their application in non-fracking activities, and lists the chemicals that are released through the process as part of the waste production phase or due to the fracturing of the rocks.

| Chemical | Type of Additive | Purpose | Non-fracking Uses | Associated Health problems |
|---|---|---|---|---|
| **Hydrochloric (muriatic acid)** | Acid | Helps dissolve rock, and make cracks | Swimming pool chemical, toilet bowl cleaner | Severe burns to skin, GI, and respiratory tract |
| **Polyacrylamide** | Reduces friction | Minimizes friction in the pipes | Water treatment, soil conditioner | Nervous system damage, carcinogen |
| **Methanol** | Corrosion inhibitor | Prevents corrosion and winterizing agent | Used as solvent and in biodiesel | Wood alcohol- can cause blindness and death |
| **Ethylene glycol** | Scale inhibitor | Prevents scale in pipes | Anti-freeze | Poisonous |
| **Gluataraldehyde** | Biocide | Kills bacteria that might be corrosive to pipes | Disinfecting medical equipment | Commonly causes throat and lung irritation, and asthma |
| **n,n-Dimethyl formamide** | Corrosion inhibitor | Prevents pipe corrosion | Plastics | Liver damage, high blood pressure |
| **isopropanol** | Surfactant | Increases viscosity of the fluid | "Rubbing alcohol", glass cleaner | Contact irritation, headache, dizziness |
| **Ammonium persulfate** | Breaker | Delays breakdown of polymer chains | Bleaching, plastics manufacturing | Respiratory distress, burning on contact. |
| **Radon** | - | Released during fracking process | | Carcinogen, especially lung cancer |
| **Methylene chloride** | - | Released during fracking process | Solvent | Memory loss, respiratory distress, cancer |
| **Polycyclic aromatic hydrocarbons** | - | Released during fracking process | | Lower IQs and developmental delays with prenatal exposure |
| **Methane** | - | Released during fracking process | | Potent greenhouse gas; explosive |
| **Benzene** | - | Used as an additive to increase efficiency in transporting proppants in the fluids- released during fracking process | Degreaser | Carcinogen |
| **Toulene** | Used as a solvent | Increase efficiency in transporting proppants in the fluids | Solvent | Headaches, neurotoxicity, liver, blood damage |

*Table 8: List of health risks due to chemicals used in fracking fluids and/or released in the process.*

Adapted from: Stone (2017) "Fracking and what the new EPA means to your Health." Forbes magazine.

As for Taranaki, the Parliamentary Commissioner for the Environment (PCE 2014) states that if hydraulic fracturing operations are carried out properly it is unlikely that contaminants will reach freshwater aquifers. However, contamination is still possible in the region. The council lists four potential routes for contamination to occur:

> (1) leakage from the hydraulic fracturing well casing due to defective installation or cementing; (2) leakage through the geology overlying the hydrocarbon reservoir; (3) leakage from improper handling of chemicals used in the process and from hydraulic fracturing wastewaters (i.e., flow back or produced water from the formation) brought back to the surface at the well site; or (4) a well blowout resulting in underground leakage into aquifers or surface recharge via spillage. The probability of a well blowout is very small, but cannot be completely discounted and has occurred during hydraulic fracturing operations in other countries (TRC 2012:24).

In addition to the potential contamination caused by the fracking fluid, produced and flowback water also bring environmental and health risks. Produced water is defined by the oil and gas industry as the "water that is produced and returned to the surface along with oil and gas [,] originated as a natural water layer that lies under the hydrocarbons in oil and gas reservoirs" (Holloway and Rudd 2013:76). Flowback water refers to that "portion of injected water fluid that returns to the wellbore after the downhole hydraulic fracturing process is completed and the fluid pressure is relieved" (Holloway and Rudd 2013:77). Both produced and flowback water can contain high level of toxic chemicals: a preliminary study conducted by the Physician and Engineers Health Energy (PSE), a non-profit energy science and policy research institute, analyzed samples of produced and flowback water that is re-used for farming purposes and/or fracking processing. The study reported a high percentage (around 40%) of potential chemicals of concern from human health and/or environmental perspectives (Shonkoff et al. 2016). Drexel University's simulation study assessed the risk of residential exposure to drinking water contaminated by fracking flowback water. In particular, they evaluated the water scenario over a 30-year exposure to radioactive substances (called radionuclides) including arsenic, benzene, and vinyl chloride. These compounds "which are known to exist in flowback and produced water as a result of occurring naturally within shale formations, pose a significant risk to human health and increase the likelihood of developing cancer in exposed individuals" (Abulfaraj, Gurian, and Olson 2018:17). In the simulation study, within eight hours "this pathway produced the highest

risks with exposure from ingestion posing the next greatest risk to human health followed by dermal absorption [through bathing or showering]"(Abulfaraj et al. 2018:1). In addition to the increase of developing cancer, "chronic exposure to these constituents can have serious adverse effects on human health, including liver and kidney diseases, neurological damage, and compromised immunity" (Abulfaraj et al. 2018:15). Table 8 shows some of the potential health effects from ingestion, dermal, and inhalation exposure to contaminants found in flowback water.

| Contaminants | Ingestion | Dermal | Inhalation |
|---|---|---|---|
| **Aluminium** | Neurobehavioral alterations; skeletal effects (e.g., osteomalacia) | No known dermal health effects | Impaired lung function and fibrosis |
| **Antimony** | Nausea, vomiting, diarrhea; stomach cramps | Skin irritation | Irritation to nose, throat, mouth; cough; dizziness |
| **Arsenic*** | Gastrointestinal and reproductive effects; possible liver damage | Dermatitis; hyperpigmentation of skin; potential occupational carcinogen | Respiratory distress in animals |
| **Barium*** | Gastroenteritis; muscle spasm; slow pulse | No known dermal health effects | Upper respiratory system effects |
| **Benzene*** | Headache, nausea, staggered gait; anorexia, weakness, exhaustion | Skin irritation; dermatitis | Respiratory system effects dizziness headache associated with leukemia |
| **Benzo(a)pyrene*** | Causes tumors in animals; birth defects | Dermatitis; regressive verrucae (i.e., warts); skin tumors in animals | Causes tumors in animals |
| **Beryllium** | Ulcerative gastrointestinal lesions | Dermatitis; skin granulomas | Nasopharyngitis; shortness of breath labored breathing; chemical pneumonitis. |
| **Cadmium** | Renal tubular damage increased risk of bone fractures | No known dermal health effects | Decreased lung function; emphysema |
| **Copper** | Nausea; vomiting; diarrhea | Dermatitis | Irritation to eyes, nose, pharynx; nasal septum perforation |
| **Dibromochloromethane*** | Nervous system disorders; liver and kidney disease | Skin irritation; potential occupational carcinogen | Mucous membranes and upper respiratory tract irritation |
| **1,2- Dichloroethane*** | Nervous system disorders; liver and kidney disease | Skin lesions; pulmonary tumors; potential occupational carcinogen | Lung effects |

| | | | |
|---|---|---|---|
| **Heptachlor*** | Liver damage; neurological effects; reproductive system dysfunction | Potential occupational carcinogen | Nervous and immune system effects |
| **Heptachlor Epoxide*** | Liver damage; neurological effects; reproductive system dysfunction | Potential occupational carcinogen | Nervous and immune system effects |
| **Iron** | No known ingestion health effects | No known dermal health effects | Benign pneumoconiosis |
| **Lead** | Malnutrition; constipation, abdominal pain, colic; neurological impairment | No known dermal health effects | Encephalopathy; neurological effects |
| **Manganese** | Adverse neurological effects | No known dermal health effects | Difficulty breathing; neurological disorder |
| **Nitrite as N** | Methemoglobinemia; abdominal cramps; vomiting | No known dermal health effects | No known inhalation effects |
| **Pentachlorophenol** | Weakness; nausea; vomiting | Dermatitis; skin lesions; liver effects; renal effects | Irritation to eyes, nose, throat; sneezing, cough; difficulty breathing |
| **Thallium** | Vomiting; diarrhea; liver and kidney damage | Alopecia (hair loss) | Nervous system effects pulmonary edema |
| **Vinyl chloride** | Gastrointestinal bleeding; enlarged liver | Skin thickening frostbite potential occupational carcinogen | Liver cancer |

Table 9: Potential heath effects from various contaminants.

*Indicates carcinogenic contaminants.

Adapted from: Abulfaraj, Gurian, and Olson (2018). Assessing residential exposure risk from spills of flowback water from Marcellus Shale hydraulic fracturing activity. *International Journal. of Environmental Research and Public Health, 15*, 727.

In January 2019, Canadian researchers found high concentrations of toxic contaminants in flowback water from fracking operations. Samples from Fox Creek, Alberta contained a class of aryl phosphates, chemical components that break down into diphenyl phosphate (DPP). DPP does not bind easily to specific soils, and its transportation into groundwater after fracking waste spills occurred at a rapid rate. Further research showed “toxic effects of low-level exposure of diphenyl phosphate on fish embryos and embryonic chick tissue” (Funk et al. 2019:50). Each year hundreds of spills are reported in Alberta, causing concern as DPP will likely “pose an environmental risk to aquatic ecosystems if released into the environment” (Funk et al. 2019:50).

In Taranaki, produced and flowback water is commonly stored in on-site pits or tanks before being transported by trucks or through pipelines for reuse, treatment, or disposal.

According to interviews with oil and gas company experts, as well as with community members, containment storage originally consisted of unlined pits dug into the ground, and it is only recently that the Taranaki Regional Council required all companies to line the pits to prevent leakage (PCE 2012:27). However, as Holloway and Rudd explain, these pits or tanks can be a possible source of leaks or spills:

> [l]ining of pits, or lack thereof, for flowback water and produced water depends on company policies and regulatory requirements, which vary from state to state. Even in cases where liners are used, they may leak either from age and wear from use or even by improper installation and upkeep (Holloway and Rudd 2013:77).

Sarah described to me how she approached her concerns on water contamination risks when she realized how water was used at the wellsites and the possibility of contamination and high level of toxic substances caused by its reinjection in the field. Having received a social science background herself, she applied her research skills to better understand how to act upon the issue.

Sarah: We didn't know what they were allowed to put in our water at that stage. So we had no connection that we might be unwell because of what they were doing. But it just evolved. And then we got the call from Kapuni and I went to...and I looked physically...you know triangulation theory?

Anna: Yes

Sarah: So three ways. How am I going to count…I am going to tell because I talk to people, I am going to look and I am going to look at the regulators' information. And the same thing happens over there. I started finding only visual inspection. Inspections where they found there had been things over the limit for potable water use but they actually hadn't done anything about it. I actually found that in their documents. I talked to people that complained of large numbers of family and people they knew that they were very sick and had a whole kind of ...it was a range of illnesses, but there was things that you might associate with being too close to these types of industries and…I also knew that the water was been taken to drink from the field, the gas field where it was as well. So there was a range of things. That became another whole process. We would talk to the south Taranaki district council. We talked about where they took the water from. We talked about where there is an area where well sites and where there was benzene in the groundswell water. We talked about the fact that benzene was allowed to be put in the water where you drew the water from for the Hawera intake. And so, there was a whole range of meetings and conversations that went around there. There was an agreement with the council. They put a benzene monitor to the water intake. They dug up all the water and soil and decontaminated all the sites.

David expressed that it was the lack of knowledge of many residents around the area that led to misunderstanding their questions on risks toward companies. His incident with the pipeline

running in fields near his farm affected the stream he used for irrigation purposes and impacted his production that year. I can hear through his words the disappointment with the indifference from some of the neighbours. As he pointed out, money[53] was what made many of the community members accept wellsites on their properties.:

David: The neighbours on the other side they got into it with blinkers on. They didn't see the big picture. When we started with the public meeting. They didn't go. That site in their place had a great impact on my farming. In the short term it disrupted my water supply. You know I didn't perceive these things ehm...there is no point, we have to live with our neighbours. Be part of the community. They would come to apologize for the stuff up. After that public meeting we started to ask questions and push some buttons. They didn't oppose us. Privately they agreed on what we were doing. Because they have not been informed. None of these people wouldn't have sites on their place if they weren't openly bagged by the oil and gas companies. They have kinda been bought. Their part. There is a problem.

Anna: You said that the water got affected?

David: Yes, there was one incident ehm they were putting a pipeline through. They went through a stream up to where I took my water and my water was fucked up afterwards. There was much shit that was pumped into that stream and I couldn't use it anymore. I hooked up to a neighbour's supply. And affected the production for the whole season. It wasn't deliberate. Someone should have seen the effects of what would happen. But they didn't. And I caught them. But you know I put that stuff behind me.

M.S, a certified organic horticulturist and counsellor/facilitator, shared a similar experience regarding water quality and her concerns on what she has been drinking for years, the water she has swam in, and the quantity of water used by both oil and gas companies as well as associated industries.

> One of the things I have been complaining about with them is the fact that they frack with toxic chemicals and then they flare for days. And all those flares and all that poison that they have used in the fracking, they say they are cleaning the well. And all that poison they put in the ground and they clean it up and put it into the atmosphere. Some neighbours want double glazing or things like that. I just want some air testing whether that is causing air pollution and considering I got my water tested and I asked to be tested for ehm fracking chemicals and there were none detected and that depends on what they tested for. /.../ So the company got contracted to do some air tests around my property and then I go into their office and think "oh that means I am not being polluted by your activities" and I got on with them but haven't believe it.

[53] What David is referring to is the compensation or restitution that a company will give to the landowner as part of their agreement of access to the land. As reported by the Parliamentary Commissioner for the Environment (2012: 94): "The conditions and compensation for access must be agreed by the landowner and the permit holder. If an agreement cannot be reached, an arbitrator can be appointed, and mandatory arbitration imposed."

In seeing how many of those in her community minimize what is happening around them, she raised her concerns in forgetting of the impact on future generations.

M.S.: but then there is the water issue and the fact they are taking amounts of water and they use clean water and put it in wellsites
Anna: And the water is from streams and rivers?
M.S.: So researching what impacts is having on the life of the streams. But then there is Methanex that is taking thousands and thousands of liters everyday out of the river to run their gas fired plants to turn natural gas into methanol.
Anna: Methanol is then used
M.S.: It is exported. Two plants. One at the Waitara valley and one on the coast. And they are taking huge amounts of water from the river and then they are doing the processes and treating that water and they put it into the Waitara outflows and into the sea. So there is a lot of issues that come with water and fracking and doing the fracking and putting the fracking waste down… they were putting fracking waste on landfarm down the coast on Waitara. So. They are lying on the land on the sandy side by the coast [...].at the moment we think there is plenty of water here in Taranaki and we are taking it for granted. We don't think that in 20-30 years we will have more and more summers when there'll be less and less water. And because it was originally a rainforest. In terms of fertility of being rainforest and as soon as the rain washes away because of hill slopes and everyone learns about it in geography and if we have no soil we don't supply. There's evidence that shows how to maintain soil. People can't think more than their lifetime or children's lifetime. And I understand. It is like shitting in your own nest /.../ It is like being blind and not wanting to see. We are a "now" generation and we don't think ahead. That's why indigenous...I actually liked your research brief because indigenous embrace indigenous philosophy that is everything connected. It is the individualism as well that we are responsible for our lives and we don't think about our neighbors and community and connection with the environment.

Talking about water quality and impacts, concerns about it have brought a few of my interviewees to avoid consuming groundwater and install a filter system as a strategy to reduce potential effects on their health and mental well-being. As Fiona addressed to me, the presence of heavy metals has increased through the years and the attitude of the companies operating around the area has been of considering the land exclusively as a commodity:

Anna: What are some of the environmental impacts you have recorded through the years?
Fiona: Huge changes in the landscape. Also the attitude, the pervasive that everything is for grabs. A very colonized attitude. Colonization in this area seeps deeply through land confiscation. So they reinforce that. So you can see the way people manage the land. We are forging the land. Having a plow in the corner and yes...And the environment, I worry about the groundwater here is horrible and I don't drink it. It is really harsh and horrible. I put a filter system and a UV light for my, ehm water system. I spent quite a bit of money to put a water system in because I use water and I don't trust it. But heavy metals are very hard to take out. So I really don't know what it is in my water. And for being a

photographer using a dark room, from the dark side but the contaminants of water is just a problem.

Several of the community members living near wellsites shared with me the possibility of water contamination and the lack of intervention from the regional and district councils and authorities:

> I: The Council has proven enough that they have contaminated groundwater in recent years. I am sure that if it was wrong the oil and gas companies would make sure that it is wrong so. In effect they have not said anything. You tend to believe that they have contaminated sites. Ehm"

> I: There is a plume of fracking chemicals that has gotten into groundwater which feeds South Taranaki- Hawera and also other counties. And that is moving towards. And when I put that..because I became a district councilor, when I put that on a table, we had an engineer that went white, the next day several monitoring were put into place. Because nobody was doing that sort of monitoring. Shell was the one that turned up to that created this plume. And around 18s oil sites where all the blow down puts were the waste and surface stuff, they were unlined. So everything was just soaking into the water and Taranaki had just a myriad of underground streams and so on. So that upset me. That I went to the regional council, made a submission that they needed to look for things and next thing I am getting told off on the newspaper has been a disgrace as a councillor. And because I had questioned these things. We have aspects at my daughter's farm. Her well water ran hot, and they got to that massive storage area where the natural gas gets pumped back into the ground cause they can't get rid of the natural gas and so...totally strangely but something must have been happening. It caused their well water to run hot. And they were quite spooked on that. And the father in law was going around doing, lighting the creeks and dropping tapers down and methane or gas was all bubbling up.

An old couple of former farmers, who spent their entire life in the Stratford area close to wellsites and production stations, narrated to me an episode linked to water contamination. At the time, they believed it wasn't related to oil and gas wellsites and their presence, despite the ongoing activity:

I1: There is a guy down the road here. He was outside the area of one km. His concern was that because he draws from ground water for water supply that what they were using there could have affected its water supply. When Andrea went to see him, this man had been travelling for oil and gas all over the world, and she couldn't answer anything.

I2: She didn't know the technicalities [laugh]

I1: I know he had a concern that what they were using down the holes could affect the groundwater. I haven't talked to him since regarding all of this whether he re-tested his water prior and after. Because if they take down a hole it could take some while to work through a water supply. But I haven't asked him yet. But again that was a concern with people with drilling because so many farmers had got their own wells and what the oil

and gas companies were doing, was it going to affect their supply? It has probably with some, but...yeah. Most of them didn't. Because we proved that. When we were across the road, we put a hole down and our neighbor too and we lost, but we lost the pressure. We couldn't draw straight from that and supply our farm, we had to turn and put a big tank and another pump. You couldn't rely or you would run out of water. We had a storage unit there and we couldn't keep it going. The other gentleman was thinking of putting another tank. Because it would fill over night when you are not using it and the cows aren't drinking as much water over night and so overnight it fills and that volume of water

I2: And we needed more water for the cows and more storage. It can affect. They don't drill directly into our water supply. You don't see where the company is going under ground.

I1: Our was 66 mt

I2: Don't know how deep he was. Funny things happen underground

I1: Yeah because at one point we had a good hole water wise. But we got a bug in it. And every 3 months you'd be spending thousands of bucks to pull this up and it was like a little soft pink blodmangel and it will block your pump. It will spill up in the pump. You would have to pull out the pump, strip the pump, and clean it all out and start again.

I2: it was a good flow of water. What we had was a good flow of water. And when they got in and they said, it was at Max Hopkins I think, around those days… anyway, they said they came across another one that had the same problem. The same sort of thing that was affecting the water.

I1: It was an organism.

I2: It was strange. We were still drinking the water. We weren't getting sick or anything. We used it for the house or…? Maybe not. We might have had the well at that stage. This was years ago now.

AB: When was this happening?

I2: 25 years ago anyway.

In my dialogues with several engineers and workers in the oil and gas sector, my questions were often answered with a reassuring attitude to emphasize that the practice has been safely conducted in New Zealand, despite the community members' experiences and recollections. R.R, na American engineer and project manager at a New Zealand consulting firm stressed to me that the lack or avoidance of disclosing what is injected into the ground and the water processing system results from commercial interest reasons, and individuals should not see this as a lack of transparency.

R.R.: So... in my understanding of the fracking process in New Zealand is that ...the vast majority of the fluids that come into the ground go back into the ground. They are reinjected. There is a period of time I understand that those fluids are kept on the surface in dams and while on the surface in dams...that there is a risk of those dams to be

compromised which I guess is not ideal. There are a lot of companies in NZ especially the one now that are well skilled and providing advice on the stability of those dams. I don't know... of any instances where those dams have compromised and infected natural water courses with drilling products. I think part of the issue is that the companies that supply drilling products often don't disclose what is in them because it is their intellectual property and they have best their commercial interest. They are NOT disclosing what is in them...being the challenge becomes ... what are you going to do with this stuff when you don't know what it is? and the position of the oil company will be... well we are going to put it back in the well. Or if not where it came from we are going to put it somewhere where it is not going to do any further harm. I guess that brings us back the earlier part of the conversation.. provided they do so down hole that is robustly supported with casings... then you have absolute certainly that all of those drilling fluids all well liquids end up back where they came from...the exercise goes wrong if the casing is not robust and… (inaudible)... you just have to be responsible...

In comparison with other countries such as the United States, R.R. clarified to me the differences in operations and how the companies use and interact with the resource extracted:

R.R.: I think that it is important to keep it in prospective. In the US where I am from there have been a lot of issues with fracking. Most of the issues have to do with contaminated groundwater. Ehm…and land, contaminated land and just general degradation of facilities. I have a paper from...that was done by Stanford University, it was published in EST, environmental science and technology, I am not sure if you have seen it...It basically explains, they review the available data on a field of Wyoming, which is representative I think of a lot of other areas in the United States. There in Pennsylvania, there in Texas, there is a lot fracking in Texas which is where I am from. There the main issues have to do especially with drinking water. But also water for stock for animals. It's that the water gets contaminated from fracking, it is done much more shallow, very shallow. Probably on the order of 400 mt. So if you are injecting fluids, we have a lot of organic solvents and acids, and under high pressure it is easy, it is possible that it could come up to the surface. That it can contaminate groundwater and that people will drink it. People drink water maybe down under 100 mt. And sometimes further if they have to. But these oil projects are only 3-400 mt deep. If you are pressurizing that strata, it is easy to imagine that it gets into…

A.B.: And it doesn't happen here?

R.R.: So...I'll explain later but…The chemicals they use are quite hazardous. Okay and the other thing there have been instances that people can turn on the water and there will be flame coming up. So what happens is that when you frack all the gas is released. Not all of it goes in the pipe, some of it rises to the aquifer and then it will be taken and dissolved gas under pressure when released into the sink the gas volatiles and that is why. And it also taste bad and there are a lot of issues with that. In NZ, they have been very lucky in the sense that, the bearing strata with oil and gas in it, it is around 3500 mt...10 times deeper and you can apply a lot of pressure to the rock and some may

escape but you can't really put enough liquid into it to make it go up to the surface unless there is a strange situation where you got a fracture that is continuous and from there, I haven't heard of that. And they do a fair amount of fracking in NZ so. Ehm. That's, so just to finish that line of thought. Most of the rural water use for households, is ehm, not what they call bore. In the US, maybe in Canada, or possibly in Italy, they use water wells for drinking water, they go down 100 mt for drinking wells, and it is expensive to put in for a household. Here most people in rural areas, there is enough rain that you can actually not have bore, and water that people drink comes to the sky and that doesn't. People you are staying with in Okato may be with water supply, maybe in South Taranaki or NPL. But I live off the water system, and all of our water comes from rain. Most people who live out in rural NZ, they get their water from rainwater. You don't have nearly the number of samples on how the wells are as you would in the US. I heard of places in Colorado, Wyoming where they have tremendous problems...they have to have drinking wells and that is probably a reason why there is not a health effect observed here. That would be observed there. If some had to do an epidemiological study of the area around those wellsites.

However, despite the higher safety in New Zealand and the lack of probability mentioned in our conversation, R.R. reiterated throughout our interview that he will never live near a wellsite, expressing his personal doubts and raising a red flag in the listener:

R.R.: That is my view about it. That is why you haven't seen a lot of opposition. There is opposition to offshore because of the impacts on marine water. There is opposition locally like in Tikorangi, because there is a really small road and a lot of traffic and wellsites are really noisy and smell bad, look bad. If I was a landowner I will never agree to have a well on my land. But that doesn't mean that if I lived down the road a mile or km I wouldn't necessarily observe as many other effects, especially if my road didn't have all the traffic on it. That is the main difference I see. Here they don't have that same physical conditions as they do in the US. /.../ I wouldn't want somebody to drill next to my house, but I don't know how to live far from those at the same time.

*Air pollution.* Air pollution associated with fracking is another concern, bringing several impacts to those living and/or working near well sites. In areas where drilling has been substantial, several cases of respiratory health problems have been reported. Robertson et al. (2020) stress the prolific evidence in the United States, with findings of volatile organic compounds (VOCs) often exceeding federal safety standards. Concerned Health Professionals of New York (CHPNY) and Physicians for Social Responsibility (PSR)(2019:26) report that "[r]esearchers have documented more than 200 different air pollutants near drilling and fracking operations. Of these, 61 are classified as hazardous air pollutants with known health risks, and 26 are classified as endocrine disruptors.".

Multiple studies have been conducted regarding "inhalation exposure to petroleum hydrocarbons in occupational settings as well as residences near refineries, oil spills and petrol stations" and these studies have shown how "an increased risk of eye irritation and headaches, asthma symptoms, acute childhood leukemia, acute myelogenous leukemia, and multiple myeloma (Glass et al. 2003; Kirkeleit et al. 2008; Brosselin et al. 2009; Kim et al. 2009; White et al. 2009) [as cited in McKenzie et al. 2012:2]. Moreover, it has been observed that BTEX (benzene, ethylbenzene, toluene, and xylene) are heavily present around natural gas development sites.

In a Colorado study, researchers assessed the health risk of air emissions from unconventional natural gas resources. The team of researchers used "EPA guidance to estimate chronic and subchronic non-cancer hazard indices and cancer risks from exposure to hydrocarbons" (McKenzie et al. 2012:1). By comparing data sets of different pollutants, the study showed that residents in Colorado living less than half a mile from wells had a greater risk of health effects from natural gas development than residents living more than half a mile away from wells. Residents near wells reported subchronic health effects, such as headaches and throat and eye irritation. These effects are attributed to inhalation of trimethylbenzenes, xylenes, benzene, and alkanes which:

> can irritate the respiratory system and mucous membranes with effects ranging from eye, nose, and throat irritation to difficulty in breathing and impaired lung function [as well as] adversely affect the nervous systems with effects ranging from dizziness, headaches, fatigue at lower exposures to numbness in the limbs, incoordination, tremors, temporary limb paralysis, and unconsciousness at higher exposures. (McKenzie et al. 2012:6)

These compounds are released during flowback operations, as fugitive emissions, during well construction, and during drilling operations.

Researchers also "identified epidemiological studies assessing the noncancer health impacts of ambient level BTEX exposure" (Bolden et al. 2015:5261); their analysis suggested that the four common chemical air pollutants from drilling and fracking operations—benzene, toluene, ethylbenzene, and xylene (BTEX)—"may have endocrine disrupting properties at exposure levels below reference concentrations (i.e., safe levels) issued by the U.S. Environmental Protection Agency" (Bolden et al. 2015:5261). BTEX compounds are associated with health impacts such as "sperm abnormalities, reduced fetal growth, cardiovascular disease, respiratory dysfunction, asthma, sensitization to common antigens, and more" (Bolden et al

2015:5261). Hormones including estrogens, insulin, and serotonin are also involved in these health outcomes. Researchers from The Endocrine Disruption Exchange (TEDX) and the University of Colorado, Boulder, warned of the potential risks due to "chemicals' ability to interfere with people's hormones at low exposure levels" (Bienkowski 2015: n.d.).

Each of the stages of the fracking process can release particular sets of air emissions that can affect the respiratory tract: "the actual fracking stage potentially emits diesel exhaust, VOCs, particulate matter, ozone precursor, silica, and acid mists" (CHPNY and PCR 2019:56). One of these steps is flaring, described as "the process of burning off excess or unusable natural gas" (PCE 2012: 80). This activity can occur during emergencies, during the completion stage or when gas cannot be piped. As reported in the compendium "[e]missions from flare stacks contribute to ozone creation and include several carcinogens, notably benzene and formaldehyde" (CHPNY and PCR 2020: 35). Flaring is linked to high concentration and release of monoxide, soot, and toxic heavy metals. In a study discussed in the compendium, McCawley reviewed the health effects linked to each of the contaminant types and concluded though the many long-term effects may be not as apparent, "[a]t a minimum, one would expect to see similar rates of respiratory diseases to that found near highways with heavy traffic flow" (CHPNY and PCR 2019: 6). In another study, researchers measured levels of carbon monoxide, carbon dioxide, nitrous oxide, sulfur dioxide, and particulate matter from drilling areas in the Pennsylvania's Marcellus Shale region. Multiple measurements from 13 different facilities during the summer of 2012 detected diminished air quality at compressor stations, which measured higher levels of ultra-fine particles (Goetz et al. 2015).

A study in rural eastern Ohio, a region heavily affected by the U.S. natural gas boom, measured polycyclic aromatic hydrocarbon (PAHs) air pollutants near drilling and fracking operations. PAHs are often linked to elevated cancer risks, as well as poor birth outcomes and respiratory distress (Menzie et al. 1992; Baird et al. 2005; Miller et al. 2004; Perera and Herbstman, 2011). Through analyzing air samples as well as personal PAH exposures, this study revealed that "living near or working near an active [natural gas extraction] well may increase personal PAH exposure" (Paulik et al. 2018:397), putting residents in the area more at risk to develop serious health conditions.

The Occupational and Environmental Health Network of the American College of Chest Physicians urged clinicians to be "aware of the potential impacts of fracking when evaluating

their patients"(Evans et al 2015:299). The report discusses how workers are often "exposed to silica, diesel, exhaust, and VOCs, and, at some sites, hydrogen sulfide, and radon, raising concerns about occupational lung diseases, including silicosis, asthma, and lung cancer" (Evans et al. 2015:299). Workers and nearby residents are also exposed to air pollutants such as nitrogen oxides, methane, VOCs, all components that can cause a range of different health impacts on the respiratory and nervous systems.

As acknowledged by PCE (2012:45), "[t]he venting and flaring of gas is the largest source of air pollution from oil and gas extraction." Several episodes of flaring and concerns about the air quality were reported to me by community members. The experience of flaring has become an invasive and recurrent episode for many. As Sarah addressed in our conversation, she soon learned that there was a lack of inspections and measurement taken around the residential areas affected by fracking operations.

> Because the air quality...the court recognized that there was a limit amount of Taranaki data on air. Very similar on what people were saying to when coming and doing visual inspections. I came down and sighted, visually saw that there was a flare, but it was clean… doesn't mean to say that it isn't emitting benzene because it is clean. When it is smoky it is emitting more benzene, but when it is clean it is still emitting benzene. So… that part of the process is still to be worked through. And at the end of that process there is going to be another four days, then the planning process where the planners actually try to write the plan.

M.S. shared her anxiety on the amount of flaring she can observe from her house and often new flares pop up out of nowhere:

> How many wellsites I can see? Or see a flare…? 11-10. And there are the two Methanex as well. I can see their flares from our place. I saw a new one recently I didn't know about. They are increasing all the time. The one across my road Manganhewa C, there is a number of different wells on that site, and they are drilling directionally /.../ I talked to an air specialist when Todd Energy did that testing…and she said that when you can smell of hydrocarbon the emissions are too high.

Experts from the industry sector stressed to me the low risks involved with flaring, the safety of the operations, and the role of the institutions to minimize activities such as flaring, minimizing the concerns raised by the community members:

I: Flaring is carefully restricted, and I have seen organizations that have to go through the ringer because they know they have run out of the number of hours per year that they are allowed to flare and they have to figure out different ways to manage excess products or any event happening on site because the penalties are huge and they take it very seriously… I guess you can take the ultimate view that any unplanned release of hydrocarbons burnt and unburnt into the atmosphere, the point of the flare is to burn them, it is undesirable... but it is a heavily consented and permitted consequence or activity that happens as a side effect either of extraction or processing. The big flares at Motunui, Methanex, Waitara... hundreds of times you can't even see them because they run so clean…it is a permitted activity…

Some engineers compared it to impacts similar to trucking and stressed to me the need to use flaring, even though it is a practice they would prefer to avoid practicing:

I2: So, the government has a national standard air quality and that feeds into the regional plans and so we have air quality plans that need consent to discharge into the air and also we have permits to regulate flaring. The whole key around flaring… the government and the regulator want to minimize flaring because it is a key asset for the country, and we don't want to unnecessarily be flaring when we put into pipes and… in terms in regulation we need to look at the duration and the time and the emission of the flare…

A.B: So how…

I2: The flare needs to be clean burning, needs to be… it helps to be clean and minimize emissions

I1: We design ehm our flaring system and pits to minimize the noise ehm on the local environment we select locations that minimize things like spill and ehm any the further noise factor when operating them and that becomes quite the sort of key decision. Key components is the fact that we do have to flare. Flaring is a little like trucking… unfortunately we have to truck with the equipment and…you know… flaring is a safety component as much as a testing component. It is around the fact that we need to clean those wells up before we put them into the pipelines because if you have seen rocks and sand and things like that just acts as sandpaper than we have issues with the pipelines so it is key that we clean the well up before we go into production… and again, the reality is..we don't want to be flaring, we want to getting that gas through production station so.. ehm once we have done that testing process, and the clean up process, because the testing component allows us to understand what we are dealing with, makes operational decision of how we manage that well, and the network of wells and infrastructures that we have on sites for processing facilities and how we deal once it gets put through.

*Noise and light pollution.* During drilling operations, noise and light can be a 24/7 nuisance to residents and workers. Noises associated with oil and gas operations can be intermittent, continuous, or vary in their intensity. The glowing caused by flaring as well as the

lights from infrastructure and machinery can disrupt the nocturnal fauna and affect people's sleep. Light and noise pollution can also affect wildlife behavior, and "[c]hronic noise from drilling and fracking operations interfere with the ability of birds to respond to acoustic cues" (CHPNY and PCR 2019:34). The light pollution caused by the flaring was a topic touched by several of my interviewees. As Fiona describes to me it creates a glow in the sky make it impossible to rest one's eyes:

> Most of the time it is continuous. You can see at night sometimes the clouds are a bit down but usually the sky glows all the time. Hmm. But at WOMAD. They don't. We had self guided tours for people to visit the outside infrastructure. We got stopped by security guards.
> Oh, my goodness. /.../ If anything happens which it can or it can't but we had a mayor saying that it is as risky as me walking across a pedestrian crossing. Funny you say that I had a cousin killed on a pedestrian crossing. Just once. The risks are there. They will tell the council. They were some flaring, and this woman put this note out for the community for Waitara that there will be some flaring. Don't worry there'll be some flaring, "don't they have a PR person anymore", But they gave her the info to put out. And then the mayor in New Plymouth "it is as risky to cross a pedestrian crossing" You have to take this risk in life. No you don't. I don't want to cut with a knife without my chopping board and chop my finger off! I take precautions. And I don't trust you guys. The funny idea they have…but that is the PR".

Similarly, both residents in Tikorangi and Inglewood area and workers operating rigs pointed out to me the effects of light pollution in their daily lives:

> I:The noise pollution, the light pollution. We had a lot of trouble with people in the neighborhood, farmers.
> AB: For the flaring?
> I: Not just that. Even the lights at nighttime. Just from the rig operating. It was called light pollution and we had to be mindful of where we pointed our lights and stuff because it was going in people's windows at nighttime. Noise as well at nighttime. We had to be mindful of what we were saying because the neighbors could hear us"

> I:Just...all the new rigs that are going up. Just like they affect you. Problem visibility. We used to have a problem years ago. One of the sites. Not sure if it was the one next to David's farm, I reckon it was burning ugly, it was burning all the time. It was burning black. I couldn't see the flame, but you could see the smoke coming up. And they ended up putting a big chimney there to burn it cleaner and you could see it sitting over the land where I used to be. Because if you just got really up early in the morning you could see the black filthy smoke. They did another chimney not too far away. Half away from Moa's place and our place. But yeah...the extra traffic. And they wouldn't do road works and make roads nice and wide. And spend money on that kind of things. What I just wanted was to travel a bit safer with all the heavier machinery on the road and extra traffic. But none of that stuff got done. We really had to put up with out of town workers.

> Speeding, extra dangerous drivers. Things like that. You could see all the flare pits going at a certain time and all the lights going so. They used to light up the sky quite well because there were so many flare pits going. Like 10 years ago. But now everything it has quieted down because of the process of the barrel of oil. Ehm. Yeah. Taranaki is totally different. When you grew up you don't really see it. But it is totally different than anywhere else in NZ. Nowhere else in NZ they got things like Taranaki has got"

> D.F.: They will flare and flare and flare continuously. And there was a horrible smell in the air and we continuously were making complaints. Until eventually in one instance the council decided they would take them back to a hearing. And would...manage to control their flaring. So we went back to that process again. And they made another consent condition around flaring. Which was that they couldn't continue to flare. They couldn't unless there was an emergency. On the land use consent one. I haven't even run the parallel of the regional council at the same time. They discharge to allow them to flare continuously, ehm that flare we were able in the land use consent, because of the discharge effect but because of the light effect, the whole sky looked like it was day all the time, they were able to hold them and they had to reduce the flare to a certain size and then they weren't allow to flare like that until they hadn't found some way of dealing with the light issue. So that was the early stages. At the point, several roads with several wellsites were going on, people would contact me, after having seen that it was very public and that the newspaper wrote about it. Other roads also came to talk to me, and asked for our help.

Studies have explored how noise exposure can "disproportionately impact vulnerable populations, such as children, the elderly, and the chronically ill" (van Kamp and Davies 2013). Ising and Braun's study (2000) revealed how loud noise can trigger reactions equivalent to a physical load, leading to serious effects on the endocrine system. Although noise data from oil and gas operations are limited, Shonkoff et al. (2016), revealed that chronic noise exposure in areas where fracking occurs can lead to adverse health outcomes such as birth complications, depression, and cardiovascular disease. Their review of the current scientific literature outlined some of the potential hazards caused by oil and gas development. Jemelita et al. (2015) drew a correlation between increased numbers of patients manifesting cardiological and neurological problems to the high density of unconventional natural gas wells in Pennsylvania.

Buxton et al.'s (2017) study quantified the intensity and degree of noise in protected areas and critical habitats of endangered species, including oil and gas production as one of the main anthropogenic sources. By comparing noise pollution and investigating the sources responsible for it, the authors found that development and extraction (and the transportation networks linked to them) resulted in high noise exceedance in protected areas. In particular, the "anthropogenic

noise doubled background sound levels in 63% of U.S. protected area units" and caused considerable interference with human-visitor experience, while disrupting wildlife behavior and community composition (Buxton et al. 2017:531).

In 2017, a team of researchers from the University of Maryland conducted a pilot study in the shale region of West Virginia to investigate noise levels in proximity to oil and natural gas compressor stations. The study included eight homes located less than a half mile from the petrochemical facilities, finding that average daytime and nighttime noise levels were high enough to represent a "chronic noise exposure that community members could potentially experience for years, not transient exposures that ceases after the completion of well construction" (Boyle et al. 2017:16). In particular, "[f]ive of six homes located within 750 m of the nearest compressor station that were monitored for the full 24 hour period had combined day-night indoor average sound levels greater than 60 dBA" (Boyle et al. 2017:7), exceeding the Environmental Protection Agency's and World Health Organization's recommended limit of noise levels [55 dBA for outdoor areas and 45 dBA for indoor areas according to the EPA regulations, and 55 dBA for daytime noise labels and 40 dBA for nighttime levels according to the WHO (World Health Organization) guidelines]. Noise exposure to levels as low as 32 dBA "can cause a reduction in sleep period, awakenings, sleep stage modifications and autonomic responses … and adverse health effects at or above this level [include] environmental insomnia, and increased use of somnifacient drugs and sedatives" (Boyle et al. 2017:11). Long term exposure to noise levels between 32 to 75 dBA have been also linked to hypertension and other adverse health effects such as diabetes and oxidative stress (Boyle et al. 2017:2).

In 2015, the California Council of Science and Technology studied in depth the impacts of noise and light pollution from oil and gas operations in California. The study reports that "researchers noted that a number of activities associated with drilling and fracking generated noise at levels considered dangerous to public health … In California, noise from well stimulation was associated with both sleep disturbance and cardiovascular disease in a dose-response relationship" (CHPNY and PCR 2019:176).

During my fieldwork in Taranaki, community members near well sites stressed how the most visible impact, apart from construction of facilities, was heavy traffic and resultant air pollution due to the constant flow of trucks before and after plants began operating. Many of the respondents that I interviewed living in Tikorangi, Inglewood, and Stratford, reported episodes of

damages to local roads, construction, and road repairs significantly impacting transportation around the area, and creating safety issues. J.B has been impacted most of his life by the hydraulic fracturing operations and the oil and gas industry in the region. At first unaware of his parent's decision to give consent to the companies to access their farming property located near Ngaere, a village south of Stratford, he later realized the big impacts caused to the roads by the constant traffic due to up to 30 trucks a day passing through the small rural backroads of what once used to be a quiet area:

J.B.: The area I came from. We were just dealing with drilling problems, and traffic problems, and consent and the attitude towards. You lived there all your life and then they come in, they trample over you. and they don't give a crap. They lie to you. The area where I was had hydraulic fracturing. Ehm….my argument, me arguing to the oil company was using fracturing as a theory if something went wrong, how could we improve what was causing the problem. When I was a kid, we had next door a run off farm. But we didn't know that kind of stuff back then. It wasn't mentioned to us, made us aware of what they were actually doing underground. I probably drank the water that was nearby. Within a kilometer or so. Fracturing back then...one of the worst wells. That was only water that we were drinking.

A.B.: When you said…. the companies came to the area where you were living…

J.B.: Yeah, we have had oil rigs around where I lived all my life. Different owners. Done different drillings over the years. So, when I was a kid there were two oil rigs within a kilometer from where our house was. We never got told there was fracturing going on. Ehm. Thinking about it they might have been fracturing going on but we never got told about it. And my parents might have been told about it but I never got told about it. Ehm. my problems didn't start until they were trying to get signatures of drilling, they wanted to do about...10 years ago. And...ehm...they got...they got consent from my parents. They were drilling over here, totally new sites had been in there for a couple of years. My parents would have lived there out of a thousand meters range, boundary was in there. The house was near there. I was living on the other end of the farm on a neighbouring house, renting it and they never approached me, and the water supply was within a thousand meters. I worked for my parents, so I had happened to be at their house one day. And this person was asking for a signature for the second round of drilling. And I knew they had never been asking me for the first round. Or the second round. And that's when I kicked up this argument because my parents were living up on a single lane road and we were getting all this heavy traffic up there and there were roadblocks and stuff like that. I actually got one of the road blocks off from there. Before you get my signature. Found out they were doing things that they said they would not do on their part. /.../ There were only meant to be like nine trucks a day, but they were banging up 30 trucks every day. My main complaint was the speed of the traffic. And I wanted a pilot vehicle to go up in front of the trucks, but they wouldn't do it. And they just...pissed us off.

These impacts on roads are something that Abbie, professional gardener who has lived her whole life in Tikorangi has noticed and often reported through her short articles, formal submissions to the Taranaki Regional Council, and directly engagements with and reporting to companies operating in the area. Her battle against the petrochemical industry's vicinity to residential areas and farms started more than 15 to 20 years ago with the help of other residents and friends in the Tikorangi community, as Fletcher Challenge, a former New Zealand-based multinational corporation had attempted to drill in the area. However, in 2013 the issue re-appeared once again through another company and this time it was impossible for Abbie and other Tikorangi residents to stop it, and deeply affecting the surrounding areas:

Abbie: It has all changed. They were always operating across the road. I mean I remember when first living here they had a well blow out. Concrete truck trying to plug. It was also low styling drilling. As soon as they started to frack here, with the Manghanewha field that the problem started. Fiona probably referred to the first battle with Fletchers Challenge… I think 15-20 years ago. This latest round with Todd Energy, it has been huge. It has completely transformed the area. There is no road. The traffic can be relentless. 2013-2014. We could not even sit outside, and the noise was just relentless. 24/7. It has dramatically changed.

The constant episodes of improper care for the roads and increased traffic levels have brought a shared feeling of mistrust toward the companies operating near farms and residential zones. As Abbie recalls to me, the engagement with companies appeared often insincere from their parts and a simple social license to operate strategy:

Abbie: I had a lot to do with companies and their lead PR. And they were willing to make compromises. And at that stage I was thinking about the Tikorangi district. Trying to pursue little pockets of Tikorangi roads. To keep that off limts the oil and gas companies. /.../ We did work quite hard. And then 2 things happened: The first breakdown came when they were trying to sign the variation of traffic state. We were affected by the status party. It was based on… can't remember the figures. three trucks and 6 cars for that well site. 42 vehicles equivalent movements a day. And Todd had a really hard time dropping it. It was somewhere over a thousand. So, they applied for a new consent. And we wouldn't sign. Council processes it anyway. They proved that the effect was less than minor. And approved it. Amish and I worked again… and actually the CEO came to see me. I got a lot of information at the Council. My emails to Todd were being forward to the Council. Instances I got lied to. I got an apology letter from Todd. Even field and then fell apart again. Most recent thing that has turned me hostile, trying to put me against the TEW group. Sarah asked me to do an affidavit and the Todd team did that and they lied. If you are going to lie to me, do it subtly. So, I can't tell.

When I went to the Environment Court to get my evidence, I sent the copy of the letter. I took a bit. And provided proof that they were lying. And I said that is not okay. They offered to meet and to discuss. I am officially hostile. And according to Todd Energy I am one of the very few owners that is not happy with what they are doing. I don't think so. I am totally hostile. I won't go to those community meetings. I find it offensive that they hold the Tikorangi Christmas community gathering. I am not going to one hosted by Todd Energy

Anna: Do they do this every year?

Abbie: They do two community meetings per year. One mid-year and one at Christmas, in December. Extensively to tell us what they are doing. And give a little bit of information. Fiona goes and photographs it. And they provide supper, and a lot of alcohol goes freely. I am not going to put myself in that situation. And that's where I sat with Todd Energy.

As PCE (2012) stresses, the impacts created can:

> "affect people who live and work in the vicinity of oil and gas wells, so well location is a major factor in determining how serious these impacts are. Indeed, much of the local concern expressed about fracking is not about fracking itself, but about the impacts on people that come with the expansion of the oil and gas industry"

In 2013, a delegation of about 50 Tikorangi residents pleaded for the New Plymouth District councilors to stop the proposed Kowhai C wellisite run by Greymouth Petroleum, as it was being sited too close to the center of the village. As reported in the Taranaki Daily News (Rilkoff 2013:1), residents expressed concerns on the future of the rural community:

> The future of the oil and gas industry in Taranaki does not depend on Kowhai C going ahead. But the future of Tikorangi as a longstanding rural community depends on Kowhai C not going ahead.

As it had been foreseen at the time by the concerned residents, the proposed wellsite led to an increase in traffic that eventually affected "the heart of the community as it was unacceptably close to the school, sports grounds, church and kindergarten" (Rilkoff 2013:1). Other residents reported to me how the roads have changed and the safety around them is lower and often the result of uncaring operators and councillors. Mike, an organic gardener, baker, teacher, activist and formerly involved in the District Council, pointed out to me his concerns about the matter:

Mike: Safety is not followed. And then you get into the backroads, massive movements or trucks. The councils don't fully recognize all the movements or trucks. They say "you can have six truck movements a day for this oil well, six there, six there" But...all those truck movements meet at an intersection by a school. And the first of the trucks come through

> the time school is starting and the kids have to cross the road from the bus stop. Is that...sensible town planning? Cut back on the truck movements, because we are going to have a congested point or find another route. That is to be fair...some of the infrastructure issues are happening with the forestry industry, China is coming a lot from us. And so, the country roads are being ruined by the logging trucks. Infrastructure has to be repaired and so on and then it carries on down the line. We are not good guardians of well-established infrastructure. The council or the operators can do whatever they like, and they just have to pick up the bills or disasters when something happens.

*Earthquakes and seismic activity.* In many regions of the world fracking and the underground injection of fracking waste has been linked to earthquakes, even in locations not prone to seismic activities. Studies in Canada, Texas, Pennsylvania, and China have indicated that the seismic risks from fracking have been "previously underestimated with much larger areas at risk and for longer periods of time" (CHPNY and PCR 2019:30).

In Oklahoma, a series of earthquakes magnitude 3.0 or higher became a regular occurrence with the advent of the fracking boom "with fewer than two per year before 2009 and more than 900 in 2015"(CHPNY and PCR 2019:30). In 2016, an earthquake of magnitude 5.8 struck near Pawnee, and became the strongest earthquake ever recorded in Oklahoma history. The situation led the EPA to recommend a moratorium on the deep injection of wastewater in certain areas of Oklahoma. Later that year a new cluster of earthquakes led the state to put stronger restrictions on fracking.

In 2015, an earthquake with magnitude 4.4 was reported near Fox Creek, Alberta, a shale gas exploration region in Western Canada. Wang et al. (2016) revealed a possible link of an earthquake to fracking operations. In 2018, researchers identified a possible connection between the high volume of fluid injected into the surface and the seismic activity. It is important to stress that "geological factors played a considerable role in determining whether a large injection volume would trigger earthquakes" and by combining the geology with the injected volume, researchers produced a model able to "account for ~96% of the seismic response variability" (2018:307). Compared to the United States, where a majority of studies indicate the seismic trigger event to be the disposal of fracking waste, these findings showed that the fracking process itself can also lead to seismic events. Davide Eaton from the New York Times compared hydraulic fracturing to a sequence of "small underground explosions [able to travel through the rock formation] "and rapidly change the stress patterns within" (Fountain 2016:1). CHPNY and

PCR (2019:189) report “[t]hese stress changes can be sufficient to trigger a slip at a critical stressed, previously undetected fault.”

A similar episode occurred near Pohang, South Korea: in November 2017, hydraulic stimulations were used for enhancing geothermal systems (EGSs). The procedure activated “two faults in a previously unknown fault system and triggered a magnitude 5.5 [units] earthquake” (2019:183). Grigoli et al. (2018) investigated the earthquakes using publicly available data including the fault dimension, mechanisms, and depth of the earthquake activity. The earthquake injured 70 people and caused extensive damage in and around the city of Pohang. Data analysis indicated that the nearby Yangsun fault had not reactivated, and that the hypocenter of the earthquake had to be located less than 1 km southeast of the injection site. They concluded that “the occurrence of the 2017 Phang earthquake was influenced by nearby stimulation activities" (Grigoli et al. 2018:1006).

In the Sichuan Basin, China, researchers studied the increase in earthquakes and linked seismic events to injection-induced seismicity caused by shale gas fracturing operations. In this region, shale gas production has grown rapidly since 2014 when systematic shale gas hydraulic fracturing in horizontal wells began. Residents reported the abnormality of the high frequency earthquakes. Lei et al. (2017:9) stated the importance “for academic, oil industry, and regulator communities to work collectively in order to elucidate the governing factors behind the high level of injection-induced seismicity in the southern Sichuan Basin, thereby allowing shale gas hydraulic fracturing to be conducted effectively and safely.”

A team of geologists researched possible causes of the Lusi (Sidoarjo) mudflow that erupted suddenly in 2005 in a volcano-like manner. The mudflow is located in an urban area of Java, Indonesia and as of 2015, more than 39,000 people have been displaced by the disaster. The team analyzed subsurface gas emissions before and after the eruption began. As reported through a series of interviews in the New York Times, “researchers largely relied on computer models and comparisons with other earthquakes and mud volcano eruption” (Nuwer 2015). One of the studies concluded that “the Lusi eruption was not triggered naturally but was instead the consequence of drilling operations” from a nearby fracking well (Nuwer 2015). In a report in the journal *Nature Geoscience,* additional data supported the fracking theory as the main cause of the mudflow. However, other scientists expressed skepticism, stating that the earthquake and

resulting mudflow was natural. However, eight hours prior to the earthquake event, engineers hit their target carbon information and thereafter things started to go wrong:

> Fluid used to maintain pressure in the drill hole suddenly disappeared; hours later, liquid from the formation rushed back into the borehole …The pressure eventually became so great as to induce its own uncontrolled version of fracking, cracking the surrounding rock and finding release nearby. The day after the well was sealed—two days after the earthquake—mud gurgled up about 500 feet from the drilling site. Had the earthquake caused the disaster, it would have done so through a process called liquefaction, in which shaking causes rock and clay to behave like liquids. (Nuwer 2015)

Dr. Tingay explained in an interview: "every clay liquefaction event that has ever been observed has been associated with gas release" (Nuwer 2015). In the Lusi case it seems that the gas readings did not show any evidence of liquefaction, although hydrogen sulfide was reported building up in the well a few hours after the earthquake. Traces of hydrogen sulfide also turned up at the Lusi vent following the few first days of the eruption, "indicating that the mud probably came from the same depth as that reached by the drill, rather than the shallower clays that would have been liquified in the earthquake" (Nuwer 2015).

Studies have presented evidence on the potential effects that induced stressor practices such as hydraulic fracturing can have on magma movement and seismic activity. Monitored hydraulic injection experiments carried out at the Hijiori hot dry rock site in Japan in 1998 concluded that the "seismic cloud […] is due to the permeation of water into joints which slip when the effective stress is reduced by the increased pore fluid pressure accompanying the hydraulic injection" (Sasaki 1998:184).

Because Taranaki is one of the major volcanic and earthquake prone regions, the Taranaki Regional Council commissioned a report by the Institute of Geological and Nuclear Sciences (GNS) to examine the possibility that hydraulic fracturing and deep injection could potentially trigger earthquakes and volcanic activity. Sherburn and Quinn (2012:15) reported that "[a]ll hydraulic fracturing and deep injection operations have occurred at least 10-15 km east of the summit of Mt Taranaki." Davis and Frohlich (1993) have suggested 5 km as a practical limit for the effect of injection fluid overpressure on earthquakes. Sherburn and Quinn (2012), who redacted the report for GNS, stated that Mt Taranaki is too far from the hydraulic fracturing and deep injection operations to be affected, and "earthquakes beneath the summit are unlikely to be triggered by those operations" (Sherburn and Quinn 2012:15). Other reports around the world have shown the link between earthquakes and fracking: a recent example is a study by Wang et

al. (2016) who were able to determine through geophysical analysis that the 4.8 earthquake that shook the town of Fox Creek, Alberta, in 2016 was induced by nearby fracking operations. As outlined in the report for the Taranaki Regional Council, although the mechanisms by which fluids can trigger earthquakes are understood, it is not quite clear how and whether the fluids could trigger or modify volcanic activity. The same report states that although the overall fluid overpressure would be "relatively small compared to natural stresses at depths beneath a volcano" (Sherburn and Quinn 2012:15), it is possible that the fluid overpressure could cause a reaction if a volcano is close to eruption. In Taranaki however, evidence that hydraulic fracturing operations have had any effect on volcanoes and earthquakes is scant and limited by a small set of data (Sherburn and Quinn 2012). It is important to remember that Mt. Taranaki is a dormant stratovolcano "with a 50-81% probability of a new eruption phase beginning within the next 50 years (Damaschke, Cronin, & Bebbington, 2017; Green et al., 2013; Turner et al. 2009; as cited in Juniper 2018: 79). So far, the study by Sherburn and Quinn (2012) is the only study conducted within New Zealand that addresses concerns regarding hydraulic fracturing and volcanic activity in the region. In her study on risk assessment of the petroleum exploration and production industry from volcanic hazards in the region, Juniper (2018) has addressed how there is a low awareness of volcanic risks, impacts, and probability of a future eruption in the petroleum sector, raising the concerns on how the industry has underestimated a future Mt. Taranaki's eruption. She urged to review the current regulations on the petroleum sectors' ability to operate during a volcanic crisis and consider the "need … to enhance and review their risk management approaches to volcanic hazards to reduce the volcanic risk to acceptable levels or 'as low as reasonably practicable'" (Juniper 2018:81).

Several community members addressed to me the anxiety they have been feeling since knowing more about how fracking operations work and the risk of earthquakes and volcanic eruptions in the area already highly seismic:

I: My main fear was that if they are doing that fracking, if we get a big earthquake here, ehm...how are you going to guarantee that your wells are going to stay intact during an earthquake? They don't know what it is underneath the ground. Even if they claim they do I still don't believe that they actually know what it is underground. Take a chance. Lucky area for gas and oil for Taranaki

AB: It is surprising that fracking occurs in an earthquake prone area and with an active volcano as well.

I: Yeah. I know what you mean. I never...I picked up a little bit on fracking and that connection. But yeah. We hadn't had a big earthquake here yet. Lucky. Especially when you think about what happened in Christchurch. And they have been hit pretty hard. Nothing like fracking, not knowing what it is going on down there. Ehm. We had a couple of good earthquakes here. But we have been lucky that nothing has been effective that way and cross the fingers that it never does//

I: Like, there are many fault lines under us right now. It is amazing that nothing actually has happened. Hmm. You think they are going to be shit scared of it but they aren't right? It is quite surprising. But…I have been in my place in the last few years and I only felt one earthquake since I have been there. And I am quite sensitive to earthquakes. The Kaikoura a couple of years ago? That scared the crap out of me. That one… we had a water tank under ground and I could actually hear the water sloshing from side to side for about 30 seconds afterwards. That was not a Taranaki one. The one we recently had in Taranaki I felt one the other day//

I: The fact there is some research saying that fracking increases chances of earthquakes...there's that issue and then the fact that there are pipelines going between all of these sites carrying the gas… What if they rupture? What if there is a flare going on and there is an earthquake. The other thing we got a dormant volcano that is due to blow at any time. Why frack underneath a volcano? You see the reports on Lancashire or Ohio where they are almost earthquake free zones until they start fracking and finally…wait a moment who is going to frack underneath the volcano? And then they start talking about drilling next to the national park and underneath the mountain to frack there. And…This is madness. It is only 400 years since Taranaki blew its top in a big way. What is it going to happen if there is a little bit of uncertainty that you start to feel as well?//

## Chapter Conclusion: Reflections on Risk

In some conversation with my participants, I perceived that the interviewees had a fragmented view of risk, and that their views and assessments were often far from the systematic and statistical analysis offered by experts, being instead heavily influenced by personal emotions and visions of how these individuals would like to live their lives. The different lines of thought regarding risk—from the cultural view (of Douglas and Wildavsky), to a psychometric paradigm (as proposed by Slovic), to the concept of risk and society (as made popular by Beck and Giddens)-— have demonstrated how the process of delineating and characterizing risk is often a challenging task. The idea of risk as shaped by social and cultural processes, as Douglas (1966)

points out, and the tension between this view and contrasting understandings of risk held by experts and the public often results from gaps in information and a differential weighting of acceptable risk where one's own life is the one that could be most heavily impacted. Interviewees have pointed out a lack in transparency in information provided by the oil and gas companies, especially when it comes to sharing the scientific data available to the latter, leading to divergent understandings of the risks associated with fracking. Furthermore, analyzing and measuring risks requires consultation with specialists who often follow different theoretical lines of inquiry, or may perceive risk differently from each other.

Interviewees reflected on experiences that indicated a need to implement the precautionary principle in oil and gas fields, especially given the lack of studies and information regarding hydraulic fracturing and its effects on the region. Reflecting on the social impacts and physical effects of fracking, there is a general lack of clarity around what is seen as risky at a probabilistic level and what can cause irreversible damage, and therefore is best avoided through a stronger precautionary approach. When speaking directly to those who I would define as experts in the sector, it has always been stressed to me that fracking's detractors use information and examples relating to other areas of the world to affirm the potential for risk and therefore the probability of environmental or social damage locally. For example, in the case of the risk of water contamination caused by fracking liquids, a senior environmental engineer at a consulting firm in New Plymouth stated that the procedures are stricter in New Zealand than in countries like the United States, asserting that water contamination is unlikely as the "bearing strata with oil and gas, it's about 3500 meters in depth and at times deeper" (personal communication 2017). However, "unlikely" doesn't mean impossible. "[I]f a situation where continuous fracturing occurs, contamination could happen. But so far in New Zealand I have never heard of that" (personal communication 2017). He stressed his point saying that the opposition in New Zealand toward fracking is mostly against the problems caused by traffic, pollution, and noise.

As I argued in Chapter Four, perception of risk in the communities of Taranaki can bring an individual to experience a sense of fear and anxiety and can often impact their physical and emotional wellbeing while accessing local environments and landscapes. Questions regarding the ethics of fracking and whether technological progress must be made, in spite of potential risks to the surrounding communities were often raised by my interviewees, who were experiencing changes and impacts due to fracking. As Immaculada de Melo-Martin, Jake Hays, and Madelon

L. Finkel (2014) point out, ethical arguments in favor of hydraulic fracturing often stress as key points the economic growth, energy sufficiency and independence that might be gained, and describe fracked gas as a cleaner source of energy than coal and other fuels. However, as the authors point out:

> [m]ost ethical and political theorists, however, would agree that protecting the public from serious harm takes precedence over enhancing its welfare …The justification for preferring to prevent harm rather than to enhance welfare under conditions of uncertainty when both are not possible is that protecting from harm, particularly harms to life and health, is arguably a necessary condition for enjoying other freedoms. (2014: 1115)

Considering all sides that they are able to recognize and account for with respect, experts attempt to formulate conclusions through rigorous scientific studies regarding the riskiness of a given practice based on the data collected. Under conditions of uncertainty, legislators need to consider "whether to run the risks of rejecting a true null hypothesis [that is to say failing to continue oil and gas development when the technology is safe] or run the risks of not rejecting a false null hypothesis (i.e., developing when doing so is really unsafe)" (de Melo-Martin et al. 2014: 1115). In minimizing false positives which occur when a true null hypothesis is rejected, "the possibility of restricting a harmless technology" is minimized (de Melo-Martin et al. 2014:1115). Or, by counterexample, when deciding to minimize the false negatives which may occur when one fails to reject a false null hypothesis, the error of accepting a harmful procedure, with respect to health may be minimized. As de Melo-Martin et al. (2014:1115) discuss:

> Under conditions of uncertainty, minimizing false positives might result in under regulation of [hydraulic fracturing] practices and this might lead to human health and environmental harms. Minimizing false negatives might, however, lead to overregulation, which may impose excessive costs on the oil and gas industry, and may jeopardize economic development.

Here arises the contrast: the collective good of technological progress at an economic and social level is set aside by the individual who, although placing trust in the expert, thinks of his/her own well-being, and potentially, the health of his/her kin and other members of the community. Risk can become a presence within the social and governmental structure that can lead to fear of bringing forward an economic benefit or technological progress. Risks may be seen as acceptable, by the state, by corporations, if promoting the desired economic progress, if the land is seen purely as a commodity, and if the voices of the people living around and exposed

to those risks are often less heard. The words of the ecologist, philosopher, and naturalist Aldo Leopold resound:

> We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect. There is no other way for land to survive the impact of mechanized man, nor for us to reap from it the aesthetic harvest it is capable, under science, of contributing to culture. (Leopold 1949, Foreword).

We live in a world where we tend to overshadow nature and favor certain technological developments. This attitude can cause irreversible damage and lead us to deny a holistic and inclusive approach that considers which surrounds and nurtures us.

# CHAPTER SEVEN: ACTIVISM THROUGH THE MOUNTAINS AND THE RIVERS: COMMUNITY RESPONSES TO OIL AND GAS DEVELOPMENT

When intensification of extractive practice breaks a sense of connection with territory, discontent often arises and takes the shape of social protests. People's needs are manifested with the aim of changing or stopping the damages made by invasive extractive practices, with an added objective of recovering traditions born of past struggles for the protection of the land (Riffo 2017). In September 2012, a report by the European Commissioner for the Environment, Public Health and Food Safety highlighted the critical environmental impact of gas and oil extraction activities and suggested that tighter management and regulations for hydraulic fracturing were needed. The commissioner pointed out the need for governmental agencies to consider how acquisitions of land for oil and gas extraction is often a form of land grabbing which poses a serious threat to Indigenous communities, farmers, and the less wealthy as well as threatening access to water resources, fertile land, and food. Indigenous populations have been at risk of losing control of their historical and cultural territories due to discriminatory management practices by various project developers as well as being under pressure regarding natural resource concessions that lead to the exploitation of resources, aquifers, minerals, forests, and impact biodiversity.

I observed different forms of community response to oil and gas development in the Taranaki region. In recent years, several environmental nonprofit organizations have expressed their discontent toward fracking operations and the impacts these brings to the land. In the conversations I had with community members involved with environmental groups, I grasped the sense of urgency to act now to prevent uncontrollable impacts to the land. In this chapter, I briefly consider activist movements and reactions that have arisen as a result of intensification of extractive practices within different regions of the world and the consequential degradation of physical spaces. Next, I discuss how people expressed their discontent and the steps they have taken to bring a change to their current living situation. These steps include court cases against companies, marches/hikoi organized throughout the region, and use of social platforms and art exhibits to protest through different media.

## A Look at Activist Responses and Ethnographic Reports on Extraction: Examples from Argentina, Papua New Guinea, and Brazil

In the anthropological literature, there are multiple case studies where the observation of activist movements against extractive practices produced a better understanding of the ties that bind people to their territory, revealing narratives of struggle, resistance, and perseverance within communities facing the changes brought by extraction. Ethnographers have produced reports in countries and communities "benighted by 'the curse' of conflict, dispossession and of course resistance and the many forms it takes…" (Gilberthorpe and Rajak 2017:188), leading to important contributions by not just "providing the 'social detail' to fill the gaps left empty … but in reconfiguring the approach to understanding resource extraction in order to effectively address it" (Gilberthorpe and Rajak 2017:188). By focusing on social relations in the extractive processes, the ethnographic approach humanizes accounts of extractive resource development, providing more than a purely economic point of view. As previously mentioned, the anthropology of extraction brings its "own conceptual toolkit or apparatus to bear on exploring the evolving dynamics of extractive processes as embedded social processes of continuity and change" (Gilberthorpe and Rajak 2017:193). This approach includes the consideration of key subjects of anthropological interest such as kinship, gifting, and reciprocity "as heuristic devices to analyse how resource extraction generates and reshapes social relations between corporate actors, state officials, and their wider stakeholders" (Gilberthorpe and Rajak 2017: 193). Amalia Rossi (2012) states that ethnographic analysis gives particular attention to the different historically limited and diversified points of view regarding different concepts of resource management in various contexts. The ethnographer's gaze regards environmental conflicts around natural resources as a result of complex interactions between phenomena of different natures and scales. A comparison between case studies can show how social and political transformations have taken place on a global scale. Environmental activism and movements have necessarily aggregated together different causes and claims, depending on the historical context. Anthropological work in these contexts is based on the perseverance of the anthropologist to build a rapport with people involved in the environmental conflicts taking place in resource extraction, from workers and local residents to activists, bureaucrats, and managers (Rossi 2012).

In her report, "Fracking and Resistance in the Land of Fire," Lorena Riffo (2017), a doctoral researcher with the Patagonia Institute for Humanities and Social Science Research

(IPEHCS-UNCo), discusses the movement against extractive practices and recollects the vicissitudes and struggles of the indigenous and local populations in the northern part of Patagonia, Argentina. Since the late 2000s, Argentina has been facing a decrease in gas and oil reserves, creating significant negative financial consequences as the amount of imported gas from Bolivia has subsequently increased. In response, provincial and national governments have supported projects related to the development of oil and gas near the town of Zapala, in the territory of the Mapuce people, near the Mapuce Gelay Ko community, which is located in central part of the Neuquén province.[54] Between March and April 2010, the Houston-based Apache Corporation began the first operations in shale gas wells. In 2013, policies subsequently led to incentive investments for fracking, promoting a framework for the promotion of investment in hydrocarbons, including a "decree that granted tax, economic, and financial advantages to companies that directly invested at least $1 billion within five years" (Riffo 2017:472). With the reform of a national law on hydrocarbons, organizations and social movements started to protest unconventional extraction. In response, Chevron-YPF-S.A.[55] began a campaign to create a positive image to gain support:

> YPF-S.A. financed theatrical production for schools in the region. The onslaught also included YPF-S.A. television, cable, and internet advertisements. These publicity campaigns increased in 2014 during the World Cup in Brazil. And finally, YPF-S.A. launched a tour featuring a fracking simulator—with free admission—around popular tourist destinations and festivals across the nation). (Riffo 2017:472)

Since the 2000s, the Mapuce communities, especially Kaxipayiñ and Paynemil, have seen an increase in pollution which has led to a strong opposition to fracking (Riffo 2017). This resistance is centered on four axes: "the management of natural resources, the socio-environmental resistance, the intercultural resistance, and the transformation of the energy matrix" (Riffo 2017:473). Protesters object to the nationalization of natural resources by state-owned companies and have demanded the management of such resources be handled in a democratic manner, with the goal of de-commodifying these assets.

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[54]The Mapuce (often spelled in English as Mapuche) constitutes the largest indigenous population in South America, with the majority inhabiting the Central Valley of Chile (Skjævestad 2008). A smaller group resides in the Nequén region, in west-central Argentina.

[55] In 2012, former president Cristina Fernández de Kirchner "re-nationalized 51 percent of the shares of the oil company Repsol-YPF, which had been privatized in the 1990s. This policy returned the YPF portion of the venture to the state as Yacimientos Petrolíferos Fiscales S.A. (Fiscal Oilfields S.A.) or YPF S.A" (Riffo 2017: 472). The following year, YPF-S.A. signed an agreement with Chevron, a result of the Neuquen governor's politics of implementing hydrocarbon extraction. In the agreement, a series of secret clauses were stipulated and caused a general discontent in the population.

Mapuce people have shown a long history of resistance to the expansion of extractivism and in the defense of their ethnic rights (Kropff 2005; Warren 2013). In 1983, with the military dictatorship coming to an end, in the provinces of Neuquén and Río Negro, Mapuce organizations supporting indigenous rights started to emerge; among these, the Indigenous Advisory Council, the Mapuce Centers, and the Coordinator of the Mapuce Parliament of Río Negro, which to this day "continue to promote and support this area's territorial struggles" (Hadad, Palmisano, and Wahren 2021:74). Mapuce people in Neuquen have focused their efforts towards protecting the environment, especially the waterways, from the high risk of contamination that fracking poses. Their ideological and political concepts "challenge the modern division of society and nature, instead advocating to cosmovisión that reminds us that we are part of nature, earth, and territory" (Riffo 2017:474). As Riffo (2017:474) asserts the collaboration between Mapuce and non-Mapuce organizations has brought to light "the historic capitalist instrumentation of nature." In this particular case study, Multisectorial contra la Hidrofractura (Coalition Against Hydrofracking) is a collaboration between Indigenous and other social groups against fracking. The coalition is described as "the most participatory space that the Mapuce people have built in its territory" (Riffo 2017:474). As a Mapuce member explained, "What's particular about the Mapuce people in Neuquén is that we maintain relationships and alliances with social organizations…The Multisectoral's value lies in the heterogeneity of its organization and approach" (Riffo 2017:474). This alliance has strengthened the fight against fracking and has led Indigenous people to organize and expand links between different people and organizations.

Conflicts involving indigenous peoples, states, and the private sector "reinforce stereotypes that make it appear as though indigenous peoples are the natural allies of the natural environment and thus of the environmental movement—and are incapable of anything but confronting and rejecting change" (McNeish 2012:39). It is often forgotten in the literature that there is a larger spectrum of positions and responses to extractive practices. In his research in Papua New Guinea on the Ok Tedi campaign, Kirsch (2007) examined strategies used by indigenous activism movements and the alliances with non-governmental organizations (NGOs) seeking to mitigate the negative social and environmental impacts of the mining industry. Since the mid-1980s, Kirsch's ethnographic research has questioned the social movements that "sought to receive compensation for and to impose limits on the environmental impact of the Ok Tedi copper and gold mine in Papua New Guinea" (Kirsch 2002, 2007). Ok Tedi was a project approved after

Papua New Guinea became independent from Australia in 1975. The opening of the mine run by the Australian corporation BHP[56] resulted in several grave social and environmental impacts. The government temporarily allowed the permit to discharge mine waste directly into the Ok Tedi River, resulting in widespread opposition (Townsend 1988). Since the mid-1980s, the mine began to discharge "more than one billion metric tons of tailings … into the Ok Tedi and Fly rivers causing massive environmental degradation downstream" (Kirsch 2007:305). As reported by the World Resource Institute (WRI), by the early 1990s, both fauna and flora were severely affected, with endemic fish and turtles disappearing, and thousands of trees killed (WRI 2003). It has been estimated that this ecological disaster has harmed more than 50,000 people "living in the 120 villages downstream of the mine in various and widespread ways" (IGWIA 2020). BHP and the Papua New Guinea government "failed for years to respond adequately to the ecological consequences of its operations" (WRI 2003:191) The indigenous Yonggom people living in the village on the Ok Tedi River wrote petitions demanding compensation for the resulting mining disaster (Kirsch 2007). After the campaign against the mine went global, representatives from the affected communities traveled through Europe and the Americas, finding support from different NGOs. From there, an active campaign was initiated against the industries and stakeholders involved in the Ok Tedi mine.

The campaign was unprecedented at the time as there was no interface between mining companies and the public (Kirsch 2007). In her comparative study on perspectives in Papua New Guinea and Australia, Francesca Merlan (2004:246) observed that the views of indigenous communities and developers are often presented as "diametrically opposed." Merlan (2004) observes that Indigenous people's attitude toward the environment is often represented as emphasizing the symbolic and the sacred, leading one to assume that there is a complete opposition toward industrial development. As Kirsch discusses, "[p]opular perceptions of indigenous movements are often influenced by the stereotype of the 'ecologically noble savage', which leads to essentialist representations that assert a primordial closeness between indigenous peoples and nature, including the assumption that indigenous peoples are committed to sustainable resource use" (Kirsch 2007:310). As Conklin and Graham (1995) assert the result is a

[56] Kirsch (2007) reports how BHP's involvement with the Ok Tedi mine, which cost $1.4 billion to construct, led to a period of rapid internationalization for the corporation, culminating in its 2001 merger with the South African mining company Billiton. Currently, BHP operates in 25 countries and "describes itself as the 'world's largest diversified resources company' (BHP Billiton 2006)" [as cited in Kirsch 2007:305].

criticism from activists toward those Indigenous peoples who are unable to meet environmental standards as set by environmental organizations, and anthropological accounts that seem to depict the stereotype of the ecologically noble savage have been discredited often as romanticized views (Keesing 1989). Several Australian expatriates employed by the mining industry in Papua New Guinea viewed the campaign against the mine as an opportunistic maneuver "motivated primarily by [the indigenous landowners'] desire to maximize the resource rents paid by the mining company" (Kirsch 2007:310). Nonetheless, public opinion in Australia "was generally sympathetic to the Yonggom and their neighbors and critical of BHP for the environmental damage downstream from the mine" (Kirsch 2007:310).

During the initial legal proceeding, the Yonggom never called for the Ok Tedi mine to close, but instead wanted to modify the tailings containment (Kirsch 2007). Nonetheless, the mining company BHP rejected their demands, explaining that the production at the Ok Tedi mine could only continue through the constant use of riverine tailings disposal. The state approved this approach, supporting the mining company to not invest in further environmental controls. Eventually, by confronting the companies in charge of the project, the Yonggom and their neighbors "were able to force the mining company to respond to their concerns" (Kirsch 2007:306). In 2002, BP agreed to an out-of-court compensation settlement of $28.6 million (WRI 2002:189). Through the Indigenous people's activism, information on the mine's environmental impacts was disseminated helping "to deter BHP's copper prospect in the Caribbean Island of Dominica" (Kirsch 2007:306). The campaign created what Kirsch (2007:313) defines as "transnational action networks" promoting "new paths and routes for the sharing of tactics, strategies, and experiences among indigenous peoples and other communities affected by mining. Following the campaign, Yonggom leaders were indeed invited by the Dene Nation in Canada's Northwest Territories to attend public hearings to review BHP's bid "to operate a billion-dollar diamond mining concession" (Kirsch 2007:306)[57].

In her ethnographic work, Manuela Tassan (2012) emphasizes how nature is often seen as vulnerable and in need of protection, ignoring the complexity of perceptions communities have of their environments and the social realities they inhabit. Tassan (2012) reflects on RESEX (reserva extratisvista or extractivist reserve), a protected area based on a socio-environmental

[57] The Ekati diamond mine began operation in 1998 and was largely owned by BHP until 2013, when it was sold to Dominion Diamond Mines. In 2021, Arctic Canadian Diamond Company, Ltd. acquired the Ekati Diamond Mine. Operations are expected to continue until 2033 (Dominion Loupe 2018).

matrix, that was introduced into the Brazilian legislative system to create a model of co-management for the territory. The protected area has led communities like that of Frechal, located in Brazil's eastern forest, to solve an age-old conflict over land access. In this area, the extraction of rubber has been the main source of subsistence for the Amazonian seringueiros since the nineteenth century. The seringueiros are traditional artisanal rubber tappers who are descendants of northeastern Brazilians that migrated to the Amazon during the rubber boom between about 1870 and 1910. Tassan (2012:131) writes:

> Each seringueiro received from the seringalista — the owner of a forest tapped by the seringueira — lsome capital and consumer goods in exchange for all his rubber production. Forced to submit to this form of unequal exchange, known as trimming, the seringueiros were subject to fluctuations in demand for rubber. After the great expansion of the sector during the World War II conflict, this production model had begun to enter into crisis starting from the 1970s. The seringalistas began to consider the production of wood more attractive than the extraction of rubber. The seringueiros were thus expelled from their territory to make room for forestry companies.[58]

After the expulsion of the seringueiros, the first forms of struggle against extraction began and the leader of rural syndicalism in the state of Acre, Chico Mendes, was the first to organize the so-called *empates*, protests where groups of individuals formed human walls around trees that were to be cut down. Towards the end of 1985, the idea of claiming extractivist reserves for the exclusive use of the seringueiros, was supported for the first time, promoting them as an original method of agrarian reform (Tassan 2012). Only after Chico Mendes's murder in 1988 did this reality begin to develop as part of a broader forest defense strategy. Extractivist reserves were introduced into the Brazilian legislative system in 1990, creating a turning point in how the environment itself had been seen by placing another social point of view within the strategies of ecological protection and management of the place.

Ethnographies of extraction have revealed narratives of struggle, resistance, and perseverance as expressed by members of Indigenous and local communities defending their land and its resources, and these show different nuances, with respect to how those in social movements and campaigns have reacted to injustices and improper resource management practices. These narratives have highlighted the reshaping of local economies, social relations, and politics. By considering these narratives anthropologists have been able to document

[58] Personal translation from Italian to English from Tassan, M. 2012. "Le reserve estrattiviste in Brasile. La cogestione delle risorse forestali in una prospettiva socioambientalista." in *Antropologia, risorse naturali e conflitti ambientali*, edited by A. Rossi and L. D'Angelo Mimesis Eterotropie, pp. 129-154.

responses to development of resource investments, progress, economic growth, and partnership agreements.

In Taranaki, social initiatives, as shaped by local activist groups, have emerged to safeguard individuals' rights to their well-being. As I engaged with community members and activists in the region of Taranaki, I recorded narratives of struggle and resistance, as well. I listened to the voices of my participants, and through them, I learned of their perseverance, their protection of their homes, their connection with the land, and of the defenses they mounted against the impacts of extraction.

## Environmental and Grass-Root Movements: Steps and Actions Taken Against Hydraulic Fracturing in Taranaki

Throughout my research, I engaged with environmental non-profit organizations, volunteers, and activists focusing on different aspects and issues revolving around oil and gas in Taranaki. Many of those I interviewed started to get involved either through a long-held personal interest or developed an interest through their own life and experience, often as a result of a specific event that directly impacted them or their family.

As mentioned in previous chapters, Sarah[59] was a source of information on oil and gas developments in her area, offering her personal glimpses into how life has been changing since the intensification of fracking activities. Her involvement as an activist began later in her life as a direct result of an impact from the oil and gas industry to her property. After an initial period of battling the problem on her own she joined Taranaki Energy Watch (TEW), a grassroots community-based group. TEW, along with Climate Justice Taranaki (CJT), is often defined by the media as one of the energy watchdogs. TEW's members focus on supporting local communities on matters of health and environmental issues linked to the effects of oil and gas

[59] In this chapter, I rely in great part on the narrative shared by my interviewee Sarah in our interview of 23rd March, 2019, to understand the court case and its process. There are two main reasons for this choice: (1) as Sarah herself is directly involved with the court case, she was able to offer-personal insights and clearer recollections than other participants who were called to testify but who didn't follow the case in its complete unfolding; (2) community members familiar with the case, in order not to create a confusion in my understanding of the process, often directed me to discuss the matter with Sarah, as they identified her as having greater expertise.

production in Taranaki and New Zealand. In our conversation, Sarah recalled her perception toward oil and gas before the catalyst that changed her life:

Sarah: How I initially got involved in oil and gas, it was always around growing up. Heaps of people in high school, my husbands' friends worked in the industry. Either were locally. There were a few sites around either South Taranaki. They were all over Taranaki. They were local. And when they weren't locally they would work overseas in Australia. So a lot of them would work on rig, and they would travel to Australia and work over there. Fly in and fly out. We had a lot of fly in and fly out in lots of places. It has been around all our lives. It has been on the farm. At my husband's farm we were there…I got there in 2003. We were there until 2010. He had been there for a long time before that. The industry was already partly there. They had a well site. Cheal A. At the beginning a single well on it. And then they had Cheal B, that had a single well on it as well. Ehm. And there were others in the area. Can't remember all the names. But there were a numbers of wellsites in the area. And ehm. We didn't have any issues in the early days when it was one well site. They were obviously exploring near us. We were not really understanding what we were doing. And we didn't have any kind of background of info about it. And they were also…in the regional line of sight we would see them originally often was over the hill, a little bit further away and not always operating either. There weren't a lot of operations happening. At then in 2006, it felt like they started to be always there. They came to our farm and asked us if they could drill on the farm nearby. We were a bit concerned about it. They arrived. They had a piece of paper. Talked to my husband. Said they probably wouldn't find anything. If they had, they would come back and discuss what it was going to happen. It was an exploratory phase. And the piece of paper only had that on and required someone in our family to sign it. Someone who owned the farm and David's brothers and sisters also owned it and since it was exploratory they allowed it could happen as they thought if they required any more information we would have to agree and sign something else. And I was a little bit cross because they arrived on Christmas eve and made us agree to sign there. And my husband said "come back and we will have a look over it after Christmas" and that's when the family talked and looked at the paper and it was exploratory. It should be alright. And we will have to have more information and re-apply and sign again. And the piece of paper had the council heading on it and assumed they went through the council. And that is the beginning of what became a difficult journey. The piece of paper that we didn't know at the time, that we do know now is that piece of paper…belonged to 100+ other pieces of paper. And they used to obtain our signature and then said we agreed to everything else. If it was going to occur. We inadvertently signed for six wells. And we had no idea at all. We thought they were doing an exploratory drill, one well. And that is how it was described. On that piece of paper that we had. And in 5 years they drilled endlessly, and we had no understanding of what would occur when they flare, what would occur when they drill, what would be put in our water. We just had no concept of it.

The choice to not sign any more consents and prevent access to their farm and the possibility of building new wells near their property flared tensions with other members of the community.

Sarah: It was in 2011 when we started to get more…ehm. The catalyst was when they came back and asked for more wells. We had 6 on our site and for memory they had agreed to make 8 on the other that was bordering our farm. And ehm…they asked us if they could sign for up to 14 and 16. And because of our experience prior to that. We didn't want to agree to sign. We wanted to see all the paperwork. And that took up to 6 months to argue with the Council, how we thought the council wasn't providing the information required. I can describe all the examples of how they went down. We would have the oil company…because we wouldn't sign. We would have the oil company sitting at our table asking us to sign. Same thing. "If you don't sign we will drill next door. If you won't sign we will fly over your property and we are doing it anyway". It went from trying to get us to sign and realizing we wouldn't. They started to bully us. They felt they were bullying us. And…ehm we felt like the council when we approached them for help, and looking at what we should do. They will just say to us "why don't you just sign it?" You can't make them go away. If you don't sign it they will still do it anyway".

Soon others with similar experiences as Sarah started to reach out and questioned the role of the regional and district councils:

Sarah: And we started to hear things from our community about how other people had been pushed as well too. From industry and from Council. How council would come along and say "why don't you sign?" and while on their property they will notice there was something wrong and give them a notice. So, we started feeling that pressure and then we started getting in the media. The media started writing our family friend stopping people from being able to go to work. It all snowballed it at that point. Our family decided that we wouldn't sign it and we would go into a hearing. And hopefully, we would get better rules in that hearing. And in New Zealand if you do give permission to sign you can never be deemed an effective party any longer. So, if things happen at a well site, then you have no level saying anything as you signed your permission.

The problems linked with regulations and the consent process eventually led to looking for legal advice and preparing to confront oil and gas companies and their operations in a court setting. Sarah would not have anticipated this step at first, but she considered it necessary to find some justice for the impacts, disorder, and inability to understand how to keep oneself protected in case of irreparable damages to their land:

Sarah: So, we decided that we'll never sign permission but we'll go into a hearing, to have better rules around it, if it wasn't stopped. And that started the next bit of the journey. The next hearing process… was fought as well. We hadn't ever been on a hearing like that. And it was the first hearing that…a member of the community blocking the industry to do what they were able to do. They provided the information, we provided the information to the commissioner. It was pointed and…I didn't understand what they meant by expert evidence at that point, so we just turned up, expressed our concerns for ourselves, and our families, and dairy farms, but at that stage we didn't know there were two parts, to the hearing process…one was the district council was heard for land use

consent, that had to do with noise light ehm…hazardous substances if they blew up, vibrations, people's effects, and then the Regional council, the discharge, the air, maintenance of water. But we didn't know they managed as two parts. And we didn't know who was responsible for what. We kept challenging the regional council. Surely, we must be affected by your resource consent as well, because if they are going to flare from 14 wells we need to know about that. Because we are quite away from them. We need to know if they are going to put the discharge into water. Because we take our water from that. But the regional council continually said that we had no say, we were not affected by the effects that something would be flaring only a few hundreds meters from our homes. And the District council, when they did their consenting, we were always worried from a safety perspective, because we felt we were really close.

The close vicinity of drilling to farms, houses, and schools created a cloud of concerns and worries, emphasized by the lack of information often received from the companies who were unable to provide a plan in case of emergency. Sarah recalled the gut feeling that it was not right the way companies were behaving at the time. The offer of double glazing or black curtains to reduce the impacts of the noise and lights coming from the wells and drilling rigs was not sufficient to a life lived in a state of constant apprehension:

Sarah: I remember my sister saying one time to them "you talk about well blowouts, pipe blowouts and stuff like that. What happens to us when something like this happens". And they said "potentially it will cut you off because the pipeline and the wellsite production station between us and the outside road. We were on a single lane, one way road. So you couldn't get out the other end, and they said "potentially if that happens we could bring a helicopter for you". At that point we realize, actually they are really dangerous. A dangerous industry and very close

Anna: Isn't it dangerous to fly a helicopter during a blowout?

Sarah: I would imagine so too. They didn't appear to be joking. And I think they were trying to say "we could rescue you" but they didn't make that feeling go away. We were kinda caught in such a situation, we were living too close to them. But we weren't able to get that message close to us, because we didn't have any experts. Now I know, we didn't have any experts of air quality at that time. Or experts in things that go bang! Flow up at that time. We just had that gut feeling, just physically too close to them. And a lot of other people knew. Because we got a lot of other people in Taranaki that were living in the same proximity to this industry as our families are. So we went through the hearing process and the consent conditions that came out of the end of it. They were things like…they could make x amount of noise, at night time and daylight. They could only have x amount of light, but they would go around offering double glazing and black out curtains. They wouldn't compensate to stop the work being too loud. But they wouldn't go later helping with it. But they never discussed hazardous substances and what might happen, What they said is that they had a diagram that said "well blowout serious" ehm…pipeline blowout serious, tanker blowout serious. But it didn't describe how far they would go. You knew there were serious things that could happen on those sites, but you couldn't visualize what they would look like. I imagine the companies could, but we

couldn't. We knew there was something dangerous happening beside us. And so we kept asking them. What is the emergency plan? How should we know what we should be doing? So they put a consent condition…I asked for the emergency plan to be part of our discussion in the hearing. But they refused. What they did was they put the emergency plan as a condition of the consent. Before we could operate, they must have an emergency response plan. So…that became part of the consent condition. We had legal advice, but we didn't take our lawyer with us to the hearing, but all that I realized was that it was me learning about the industry. That later in the interview, you'd realize that I needed to go through this to understand what I should later. It was all part of the story. We weren't happy with the consent condition and we used the consent condition to hold the company to account. Because we never signed any written approval. They will flare and flare and flare continuously. And there was a horrible smell in the air and we continuously were making complaints.

As complaints increased and the issues due to flaring and air quality became more frequent, it became inevitable to have full legal support rather than dealing with it individually:

Sarah: In 2012 we went to court with the first set of hearings, we started to lobby the people and PCE, the first one came out in 2012. We kept lobbying and then we went down there and came up here and in 2014 PCE the report came out. And in 2014, just as the report was coming out I received the first image of the response plan which made me realize that the PCE had missed the whole understanding of well blow out and hadn't covered any of that because they couldn't see a difference between the application and what actually was going to happen if an emergence was going to happen. And so from there, her report came out, in 2015 I met that lawyer. And we had to wait for the first plant to be publicly notified. And in the meanwhile we were waiting for that to occur. We needed to have an expert. We decided on air, and experts risked being blown up and we set an interview or being interviewed by them to see it was a case they would agree on. I supplied the experts with all lot of photos that showed right throughout Taranaki land, houses and industry so that they could get a sense of how close they were and the same with the air. And I supplied them with all the current consent. They both agreed to work for us and then the lawyers, I had a junior and senior lawyer and both agreed and then we saw a planner and we knew someone else well and we interviewed them and they interviewed us. There is no point in taking a case that can't be won. I have to admit I don't particularly like the industry but if they were operating in such a way that meant everyone was safe and alright and you can't argue that climate change truth remains I would accept that. But it isn't the case. The fact is that they weren't operating like that and the district plan wasn't addressing those issues. Of fatality and serious harm. And so that's how we ended up. Going through this all the time. And presently, I can't speak where we would get to, but presently we went and put a submission in to support buffer distances and to support on grounds of serious harms and deaths for the risk of being blown up, the risk factors of fire and explosions. And then we put another one around the air that said that air discharges are the Regional Council but that people shouldn't be…there should be a reverse sensitivity and people should not build their houses right up against these.

In 2016 a report by the Parliamentary Commissioner for the Environment on drilling for oil and gas in Taranaki highlighted oversight and weak aspects of the regulations and suggested developing a National Policy Statement. After the report, the South Taranaki District Council, Stratford District Council and New Plymouth District Council went through a reviewing process of their oil and gas plans and rules. According to Sarah, by that time she had found support through Taranaki Energy Watch (TEW) and the group filed an appeal to the Environment Court over the proposed rules making stronger regulations around the oil and gas industries. During the process of consulting with experts and attending the first hearings, they discovered other concerning aspects they were not aware of:

Sarah: We can't affect what the regional district council does going that way. But we can affect stopping more people getting harm's way. That is…we actually divided the court cases in those two parts. Two different experts and while we were going through the process something else occurred. And it was seismic surveys. And you would be familiar with Canada and their regulations with seismic surveys. So we started hearing that we started to get calls from people saying things were broken at their houses and that some of the detonators were not going off and we went around door knocking to find out what people were saying. If you are giving the info and you sign it and you know that they are not going to go off, then that's your issue, if you know that information. But if you aren't giving that information and you sign it and they don't go off, that's not fair. And we started to hear things from people they never agreed to, and in some cases we met with the industry and one of those people and we had a conversation across the table on how unhappy this person was and they started telling us as if it didn't matter they wouldn't go off. I was shocked at the time because I hadn't visited them and they were going through a process, 450 ft square km, 48,000 kgs. of TNT, 24,000 shock holes across this 450 square km and it was a permitted activity and some were not going off. And I started to look at Canadian laws seeing there were legislations that if you had to have anyone don't turn on, put them on a map. That generally speaking you couldn't go back and take them out. It was too dangerous. To do that. So you had to highlight them on a map. I got in contact with the head of the international geophysical contractors, someone at Fort MacMurray and the BC government run a site over there and he put me in contact with the chairperson of the group and in between our dialogue I was able to look at what best practice would look like in New Zealand. What the least to be expected and I explained my concern and then we contracted seismic experts from Australia. After many talks with many seismic experts in New Zealand none worked for us because of conflict of interest with the government. They were even working for memory defense forces…or tourism New Zealand and they just felt they will be jeopardizing their contracts. And he was able to take the case and to have contact in Canada and work him through the court process in New Zealand. And this hasn't been ratified yet. It has been agreed by the court.

Seismic surveys allow companies to obtain an image of the rock formations below the Earth's surface and identify where "oil and gas reservoirs might be present, and to provide

information on the types and layers of rock, the depth and extent of aquifers, and the presence of faults" (PCE 2012:32). Seismic surveying takes place during the exploratory drilling phase generating seismic waves by lowering small explosive charges into shallow bore holes known as shot holes (PCE 2012). When detonated, the energy released is transmitted through the strata to the surface and detected by geophones, a device converting ground movements into voltage.

Residents who signed consent for companies to perform exploratory phase surveys in the vicinity of their homes reported that they often received misinformation from the companies and specific details were omitted. An interviewee suggested this misinformation was to avoid the landowners rejecting the companies' access:

I: You could feel the vibrations in your cars, in your house, at home life was shattered. They were not transparent to us. Then they wanted to stop the noise and put up these bales of hay. To mask some of the noise. We had a specialist to noise control, is it blocking the sun. And we paid all this money for the specialists and then at last minute they didn't mitigate with our specialist. And we decided not to do it anymore. I could call them lots of names. And I worked for the industry as well, for Motunui and I know people that work in the industry and it isn't a real fight against the industry. Injustice. It is really really what makes me angry. How they could lie so much. And didn't pay for it.

Sarah explained that multiple explosives may be used and not all the charges may go off, depending on the type of mechanism used to detonate:

Sarah: If you use electricity, your chances are 1/100 not going off. If you use electronics, 1/1000. The landowner must be told there is a possibility they don't go off. And that it stays on the limb. And there is no time period able to be given to know when they cannot go off again. Because what was shown in court is that you never know. So basically, they are indefinite. We have no responsibilities about compensation but those must be in place.

Undetonated explosives require a decade of controlling and monitoring. As both Taranaki Daily News and Radio NZ reported, this will mean affected Taranaki residents face restrictions on land use and the potential for unexploded explosives is recorded on their Land Information Memorandum (LIM) report (Martin 2016:1). The LIM is completed by a local council and details everything that has been occurring on that particular property, from features to the land to drainage and plumbing. An email from the Taranaki Regional Council to Shell Todd Oil Services said, "the company said it expected the explosives to be inert between two and three years, but that it monitored misfire locations for 10 years" (Martin 2016:1). The former General Manager of Operations for WorkSafe, Brett Murray, described the difficulties in retrieving and detonating the

explosives and that the available solution is to leave them underground and wait for them to biodegrade, a time frame that can be up to a few years.

Many residents reported that they were not informed of the possibility of undetonated explosives and were shocked to find out. At the time, Shell Todd Oil Services reported surveying 450 square kilometres of the Kapuni field in South Taranaki, using more than 24,000 seismic charges (the equivalent of 48 tonnes of explosives), with more than 1,400 landowners possibly affected (Martin 2016). Farmers interviewed by Radio NZ reported having at least 28 live charges lying dormant in their property. In the interview, one of the impacted residents stated he feared that detonation could compromise his plan to regain organic certification (Martin 2016). Initially he expected three to four explosive charges to be laid on his land and he did not expect 29 red pegs indicating explosive material to appear on his property. The farmer agreed to the nonexplosive white pegs and vibraphones (devices used for recording seismic discharges) on his property, provided that "the surveyors followed the requirements for working on an organic property, which include sterilizing equipment before it entered the site to prevent cross contamination from other farms" (Martin 2016:1). Established agreements and protocols were not followed and so the farmer requested all the equipment to be removed. In an interview with Robin Martin (2016), Sarah said the initial consultation was done under the requirements of the Land Management Act and that the impacts were being referred to as minimal. However, Sarah said this process should have been covered by the RMA, which involved more consultation and analysis of possible adverse effects:

> They have undetonated explosives on their land that can be likened to land mines and this affects the families that live there long term and yet neither of these councils has informed the landowners of the risks and here we are with 14 properties that are potentially going to have them recorded on their LIMs (Martin 2016:1)

Sarah explained that the experience of having explosives detonated can be quite invasive and results in having to deal with companies accessing the property more often as well as potentially impacting the soil of organic farms and the integrity of a farm's status. Detonation can also bring disturbance to other farm operations such as milking. As reported on the Taranaki Energy Watch website, the concern is higher regarding undetonated explosives as they have been linked to possible groundwater contamination:

> The explosives can contain Pentolite, which is a mixture of Trinitrotoluene (TNT) and Petnaerythrivol Tetra Nitrate (PETN). Pentolite is listed as a class one explosive by

> WorkSafe and requires a license. Licenses for explosives including TNT (1.1D) and PETN (1.1B) are listed for the Taranaki area on the WorkSafe explosives register. Both PETN and TNT are also listed as synthetic materials by the USA EPA and are known to cause contamination of groundwater. Under the Taranaki Regional Plan, explosives must be located at least 100 m from any water sources, bore, or streams. However, there have been a number of instances where explosive have gone off much closer to water sources and retrospective resource consents have been granted. There is a real concern that if explosives are let off too close to a water bore that your groundwater can be permanently compromised. (Taranaki Energy Watch 2016:1)

As the companies wanted to enlarge their wellsites and construct more wells on the East Coast of the North Island, more complaints and legal actions began. This prompted Sarah and her husband David to actively engage with the communities living in those areas, bringing their knowledge and experience to prevent the repeating of the same scenario:

Sarah: Until eventually in one instance the council decided they would take them back to a hearing. And would…manage to control their flaring. So, we went back that process again. And they made another consent condition around flaring. Which was that they couldn't continue to flare. They couldn't unless there was an emergency. On the land use consent one. I haven't even run the parallel of the regional council at the same time. They discharge to allow them to flare continuously, ehm that flare we were able in the land use consent, because of the discharge effect but because of the light effect, the whole sky looked like it was day all the time, they were able to hold them, and they had to reduce the flare to a certain size and then they weren't allowed to flare like that until they hadn't found some way of dealing with the light issue. So that was the early stages. At the point, several roads with several wellsites were going on, people would contact me, after having seen that it was very public, and that the newspaper wrote about it. Other roads also came to talk to me, and asked for our help, And I still haven't understood all of it. It is such an evolving story. I would go and talk about and I would advise and say "never sign a written approval. Even if you stop them to go ahead, don't give them written approval". Because it means that if anything goes wrong afterwards, you won't be able to complain about it. And So, people stopped giving them written approval and they wouldn't object to them by going to a hearing. But there was.…four hearings in a row. So, they wanted to enlarge Cheal C, build a new well site out east, they wanted to put a well site up near the mountain. Near the park boundary. They wanted to put one down near Cheal G. And one at Cheal D. They were going all over the place. So, I would call the people, so they knew their rights "don't sign consent. Go to a hearing" so if you could get the best condition, you could. And in all cases, they kept writing that the emergency plan will come later. And this continued for probably a year. And at this stage they were probably east coast as well. My husband and I decided that we were going to talk to the East coast. And we would lobby the parliamentary commissary for the environment. To come and investigate here in Taranaki what was happening. Because what I was finding was during my investigation into them is that they didn't seem to be any standardized rules. What was happening in NPL district would be different in Stratford and it would be different in South Taranaki. And they

didn't seem to have any standardized rules for the regional council either. And there wasn't any notification for people to know that they were part of a potential affected area for a discharged consent.

At this point other environmental organizations including Climate Justice Taranaki began to be involved and supported the call for a dialogue with the industry. The goal was to reduce environmental and health impacts caused by conditions that did not reflect industry standards. Many residents were going through the same issues as Sarah:

Sarah: We started to run our fracking tours. And showed people from other places what it looked like, and they invited other people to come and look. So, if they were approached by the oil industry, they could see what they were going to get. And I took a lot of photos and other members from my community to show what they couldn't get what it looked like. And they…other coast at the issues around…different than ours. On water, shortage on water. They had industries that were organic, apple and orchard industries. Wine industries. And they had…they were a different type of area as well. And after what they saw here, they didn't want them, and they started to lock them. They started to refuse access.

Anna: And here…

Sarah: Even here but people wouldn't talk about it. People got together over here and said if they come in here, we would say no. There are places here, but it is much harder to go out there and say that. And there is a lot of industry people that actually live there too. And It is always surprising.

At the beginning of my second fieldwork phase, controversial news was released that government companies, the Ministry of Business, Innovation and Employment (MBIE), and the Crown Research Institute had used private investigators from Thompson & Clark Investigations. Ltd. to conduct surveillance on individuals and activist organizations in different parts of the country opposed to the oil and gas practices, including Taranaki (Martin 2018). In Taranaki, the surveillance had been used for years with the objective of "protect[ing] the oil industry and counteract[ing] the advocacy work of environmental groups" (Greenpeace 2018:1). A report released by the State Services Commission regarding government agencies' use of external security consultants listed Thompson & Clark investigating several organizations including Save Animals from Exploitation, Oil Free Otago, Climate Justice Taranaki, Farmwatch, The Green Party, the Mana Movement, and some iwi groups (Martin & Mount QC 2018:12).

Radio NZ reported that the MBIE breached the State Service Standards of Integrity and Conduct due to a failure in keeping a level of objectivity and impartiality. An exchange of emails revealed that Thompson & Clarke and MBIE established a relationship on several occasions. In

the report conducted by the State Services Commission, there was a discussion of how the most significant feature of the relationship between MBIE and Thompson and Clark related to 'Operation Exploration,' a key interagency governance mechanism established by MBIE following 2013 amendments to the Crown Minerals Act. "This amendment created offences for damaging or interfering with structures or ships being used offshore in prospecting, exploration and mining activities—including incursions into specified non-interference zones" (Martin & Mount QC 2018:66). The design of Operation Exploration was influenced by the concept of "issue motivated groups," as described by Thompson & Clark in newsletters and threat assessments. The Commissioner who redacted the report stated:

> While the label can have some potentially valid applications, it can give rise to human rights concerns if it is applied indiscriminately – for example to those protesting legitimately and peacefully – and can take the focus away from risk-based analysis. The label can also delegitimize groups and inhibit constructive relationships between the government and stakeholders or interest groups. (Martin & Mount QC 2018:12)

MBIE also established the Minerals Exploration Joint Intelligence Group (MEJIG), set up to coordinate intelligence for agencies linked with enforcing the laws regarding offshore petroleum and mineral exploration. The goal was to "highlight activities that might potentially lead to interference with offshore petroleum and minerals exploration" (Bennett 2018:1). The MEJIG was led by NZ Police, although "the operating tempo of when that group met was often determined by Thompson and Clark, as it related to when exploration activity occurred" (Bennett 2018: 1). Through these mechanisms, the relationship between Thompson and Clark and Operation Exploration was very close, with the investigative firm attending meetings with officials as key participants (Bennett 2018). The information available to the Inquiry showed that surveillance was the primary mode of operation conducted by the firm. Surveillance was most likely paid for by private-sector petroleum and minerals interests to keep an eye on activist organizations. Thompson and Clark used infiltrators and worked closely with the company Solid Energy, sending individuals into anti-mining groups such as Save Happy Valley[60] and tracking their movements. MBIE therefore did not sufficiently ensure a distance with Thompson and Clark regarding the "operational and planning process of the government's enforcement of the Crown Minerals Act 1991" (Martin & Mount QC 2018:10).

[60] Save Happy Valley is an environmental activist movement created with the purpose of preventing the realization of the Cypress Mine, an open cast coal mine proposed for the West Coast of New Zealand.

Considering the peaceful protests that characterized activist movements in the region, the surveillance operations seemed unreasonable and unjustified for many of my interviewees. Their thoughts revolved around a loss of trust: a weakening of the confidence in governmental agencies, their apparatus, their transparency, and their objectivity. Mike recalls that it is scary to know that one is surveilled and that this can undermine the way you establish an open dialogue with the government and its agencies:

Mike: We organized a bus tour to take people around and visitor to show the extent of the oil industry in Taranaki. Because of all the valleys like these, if you have driven around, suddenly you come up to an oil well and it is connected up to 3 or 4 other fields. And you think "how did that get here?" So, it becomes a very tricky tricky thing. We jumped on the bus from Ngaere where Sarah and David lived and we pulled out a bus from the driveway just down the road, and then a man pulls out and starts to follow us. And then that turns into a gate and then next gate and then another man pulls out and follow us. And I started to get spooked up and next thing you know a car starts to follow us. We would stop at one point and then the car would stop just 15 m down the way from us. And then someone went and approached the people in the car. Later on, it turned out that they were from Thompson and Clark who are a detective agency who had been infiltrating conservation groups, who had been infiltrating trade unions groups, the government has employed them in different department and ranges of different roles to find out information on what it is going on with people who have been active. So that became you know it became a bit scary and there is quite a bit enquiry going on lately, you play some big games here.

The active mobilization of community-driven knowledge was visible at the tours and meetings I attended. These meetings gave me a better grasp of the point of view of the environmental activists and volunteers involved in non-profit groups. Farmers who had led a regular life were forced by the circumstances to document their experiences, gather as much information as possible, become interpreters of policy and regulations, and back up their findings with researchers and experts. As Sarah and others pointed out, often the process involved lots of research and interaction as well as meetings with representatives at councils to shine light on what was occurring to their land:

Sarah: So, there was lots and lots of questions around those as we continued to lobby and our groups did and climate justice got involved as well. At that stage I hadn't joined TEW. We were just a family that had concerns. And my background was at the time in 2011, I won an award for a year. I was doing some Masters papers and research there. And for education work. The research theory. One paper in particular was triangulation theory. After I finished my degree in anthropology, I went on doing fieldwork research as well. I thought I will use our area as a case study. So, I'll review, and I was a trained auditor, and I will use my auditing skills, I will audit Cheal, TagOil and their relationship with district councils and regional councils. And that made me really concerned. As they

were things happening on these sites and they didn't appear to be any regulator responsible to them. They would turn up, do their environmental monitoring, the regional council would and I just saw time and time again when they would report "went on the site, looked to see if there is any concern. Visually there isn't any concern" And then they will give them a big tick.

Anna: So, no testing?

Sarah: No testing. With all the consent conditions, we put things that needed to be tested. So 15 percent of…benzene in the water…it need to be a certain amount to be released by it couldn't go over that. There was no testing of the produced water that it was going to be released. There was no testing of the land where they put the waste. There was no testing of the air. And…regulators would come to the site at various intervals and walk around the site. That is the description, that officially they could see no issue. And they would leave again. That became a really big issue. How do you know you met the consent conditions if you are just actually looking at it and you are not testing for it? And at the same time I found a similar approach with the dairy industry, which made me realize that I was actually, right… probably right on the money about what I was saying, that the dairy industry had just been,,… regional council had been the auditor general, we got four councils and one of the things they highlighted in their report is that the reason the regional council had such low prosecution and such high compliance is that only visual inspector were also used for the dairy industry. How do you know if there was a issue or not if you are actually looking at it and the conditions actually require you for the consent? Became very technical but then I got approached by… I had done this big thing around Cheal. I pushed towards the PCE and this is what is happening over here and we are very concerned. At that point still not realizing that the biggest problem would be later on…We discovered that these places can blow up. And then I got a call from someone living in Kapuni, talking about people that were unwell. And we reflected on ourselves that our family was unwell. So, we had things in our family with things like nosebleeds, rashes, headaches. We hadn't kind of connected at that time with the industry. But we now understand.

Sarah stated that people often felt reluctant to talk about their health problems when she began asking around her area. She described a reluctance in linking their problems to fracking exposure. Sarah also asserted that the lack of epidemiological studies in the region creates a level of uncertainty. She described a sense of shame pervading those whose health conditions had been aggravated for years. A different member of the community who was impacted by the well-sites confessed:

I: Thinking of any health problems… the asthma my kids have had for years, cancer in the family…what companies have injected or done to the land…Well…I let them in. I let them in…not knowing of the consequences. I feel angry at myself for it. What if anything happens to my children? What will be future of my grandchildren?

Mike, an organic farmer and teacher who has lived most of his early life around Kapuni, described how in the late 1980s and early 1990s he started to notice the high incidence of people

getting sick and dying due to tumors and cancers. Seeing what was happening around him pushed Mike to get involved in the regional activism. Mike explained that he eventually attempted to report the situation to the Taranaki Regional Council but his concerns and the stories of those impacted by fracking were ignored:

> When you know an area well and the people, you know just everybody that lives in the area, you can drive along the road and say "yes there was a breast cancer dying person there, a brain tumor there, a deformed birth there." And you start to pull it all together but unfortunately when you present what you have got to the Council they say "we want proofs! We want the medical files!" But you can't get those because they are confidential, you don't…people get sad about real awakening, some of the memories of their loved ones. There is a sense of shame and guilt. That became our main thing, the constant wondering of how it could have happened… and then we found out about fracking.

Knowledge and information sharing sessions were held at the end of 2018, when I was invited to attend a presentation by members of TEW and CJT on hydraulic fracturing, oil and gas exploration, and climate change. This presentation occurred at the summer gathering held annually by Quakers Aotearoa (The Society of Friends Aotearoa New Zealand)[61]. The summer gathering is an annual residential camp established in 1956, where people from all over New Zealand, following Quakerism or not, can join and share a communal time together. One of the organizational leaders explained that the gathering creates the opportunity to discuss important topics of concern while addressing issues that have been impacting communities. Another organizer explained that Quakers acknowledge the effort and help from environmental activists in putting into action changes needed to safeguard the environment, sharing with them many values and concerns toward the land, air and water, and global deforestation.

[61]Quakerism in Aotearoa New Zealand is Christian in its origin and inspiration but is open to ideas and values from other forms of religious expression.

*Figure 27: Vertical Horizon, Inglewood, Taranaki.* Retrieved from:https://quakers.nz/node/42/events

I listened to TEW and CJT advocates and experts present research and data as well as stories of their personal experiences and legal action taken toward oil and gas companies in the region. As they explained the history of fracking in Taranaki, how fracking works, the associated risks, and what steps have been taken to prevent its continuation, the audience asked questions. Many in the audience acknowledged that they were in disbelief as they had never heard or imagined that fracking was occurring in the country. Others said that they had only seen images of fracking wells through documentaries such as *Gasland* and in newspaper articles on impacts in the United States.

The first hearing regarding the appeal from Taranaki Energy Watch over the South Taranaki District Council's (STDC) proposed rules around seismic surveying began in March 2018. The hearing adjourned in August of the same year. On November 23rd, 2018, the Environment Court submitted the first interim decision and findings. Sarah explained some of the key elements that were discussed and what the Environment Court stated:

Sarah: In 2018 we had our first hearing. And because we appealed it, ehm…to the South Taranaki District Council, it is really obvious that Stratford district and NPL district

> would follow the same as South Taranaki. So, they did a process they call S274. They joined the appeal against us and so all three went in there and PEPANZ joined the appeal and so everybody was in there. Yep. And so now we have a situation where we have had interim findings which have supported energy watchers ehm…evidence and that is that these sites need separation distances. Because they are incompatible activities. That ehm the hearing in public domain now. So, the interim findings say that ehm there will be based on risk of fire explosion based on 1 out of 6. A fatality of consequence, frequency of consequences gives you the fatality risk. And one thing that you can draw a…I call it circle…but you can draw an area around a well or production station you should not do activities like residential activities in that area. You can still farm because you would be walking around in and out. But you won't be living 24/7 like you were in a house. And they'll do that. And then the other thing they said is that…that's for…incompatible for people to build houses inside that area. At the moment those areas are going over the pedestrian boundaries. So, their fatality is out in someone else's paddock. So at the moment they have externalized the fatality risks onto people's paddocks because there is no home around. They are using those paddocks as a buffer zone. Which potentially they are not going to injure anyone because there is no home around. But what they have done is to stop it. Because if someone is going to build a home and wants to put it there they are going to say no. The second thing the court has now said it is that from now on going forward, any new production station and any new wellsites have to internalize their risk. Of fatality inside their own pedestrian boundary. They can't use someone's empty paddock next door to do that. So that means potentially if they can't do that, they will have to buy more land to do that.

Another element investigated in the hearings was the appropriateness of hydrocarbons and petroleum activities in residential areas and whether the air control and monitoring were done sufficiently. Regarding activities in residential areas the Environment Court decided that the high-risk profile of some petrochemical activities is deemed inappropriate near residential areas and townships. The Environment Court stated in its decision that benzene emissions from well-sites and production stations have the potential to create adverse effects on human health:

> The very limited Taranaki-specific benzene monitoring data (emissions and ambient air quality), presents serious difficulties for both the experts and the court in terms of reaching firm conclusions. The District Council and PEPANZ positions were that the Regional Council adequately controls air discharges so that further controls on land use under the pDP [South Taranaki District Plan] are not required. We received no evidence from the Regional Council to enable us to test this position. (Taranaki Energy Watch Incorporated v. South Taranaki District Council 2018:20)

The interim findings reported that limited monitoring data had been done in Taranaki related to benzene emissions and ambient air quality, presenting "serious difficulties for both the experts

and the court in terms of reaching firm conclusions" (Taranaki Energy Watch Incorporated v. South Taranaki District Council 2018:20). Sarah said:

> Because of the air quality…the court recognized that there was a limited amount of Taranaki data on air. Very similar to what people were saying when coming and doing visual inspections. I came down and sighted, visually saw that there was a flare, but it was clean… doesn't mean to say that it is emitting benzene because it is clean. When it is smoky it is emitting more benzene, but when it is clean is still emitting benzene. So… that part of the process is still to be worked through. And at the end of that process there is going to be another four days, then the planning process where the planners actually try to write the plan.

The hearing process and the different stages has been a challenging moment for Sarah and other residents who have appealed for changes in the regulations. The form of activism carried by Taranaki Energy Watch (TEW) and other non-profit organizations has resulted in many of the members becoming as knowledgeable as experts. However, a lot of hostility remained:

Sarah: I feel resistance and bringing up things that are actually brought in to slow the process down because there is already a lot of understanding around a lot of these things. They are already doing privately; they just don't do it for the district council to be able to land use planning. And there was a huge push back from the council to us, saying that they are not responsible for land use planning around these sites and we had to go at the expenses to bring WorkSafe in, which is another government department to tell the council that they are responsible, and that is what the court has told the council that they are responsible. But it is so disappointing to spend all the energy doing that when the council already has information from WorkSafe to say that they are responsible. So you feel all the time that the council should be operating in the best interest of the situation for both the industry and the people that live next door to it. But you need to get a sense of that. And I never had a sense of that. Ever. In my dealings with the council. I had to sit at hearings where at the end of the hearings happens before you even get the outcome and watch, physically watch the representatives from the council, walk across, past us, shake hands with the industry at the opposite table. Yep. And I have watched and got feedback to me councilors saying that they have been told that they must not talk about these things to me. Yeah, and that is a long story because it is up to balance for me, working in education part time, where serious things happen with terrible ehm…shooting at the mosque and you try to work out perspective. Because for me I often wondered about this, now that I know what I know and now that the expert says that I am right. Once you know, you can't unknow it. So, I felt I couldn't not, and my family felt that we couldn't not continue. Because if we knew these people were living in these areas and they potentially can build houses and catch their families and already people inside them. We couldn't not do anything about them. If you knew. And I am thinking in terms of the shooting, which is probably not a good example, but in terms of everything that isn't good about the way people operate, the extremists right wing or anything. Anything that it doesn't go…that it is part of the same picture. You know. But it is just another element of it. You could be spending your time working on age care because I have been spending 6 years helping with my mom and nursing in age care

> because I know it is inadequate the support our people are giving to. Every week you could have examples of what you could be working on and in the end because we spent a lot of time and understood it. If we stepped back on this, no one else had knowledge…There is only TEW that knows this stuff. And if we sit back from this, there will be a vacuum again.

In October 2020, the Environment Court ruled in favor of TEW's appeal, imposing a safety buffer zone around hundreds of oil and gas wells and petrochemical installations in Taranaki. The buffer zone, which must be included in the South Taranaki District Plan, is 250 meters for well heads and 650 meters for production stations minimizing the risk of injury or death to members of the public in a fire or explosion. South Taranaki District Council stated that "the decision struck a balance between managing risk and recognizing property rights" (Martin 2020:1), and although previously it had assumed that existing safety risk distances were sufficient, it has accepted the new rules addressed in the District Plan. No appeal is foreseen in the future. Representatives of Taranaki Federated Farmers, a trade organization,[62] expressed their worries regarding the buffer zones. In an interview to Radio NZ, the president of the association pointed out the loss of farming land that could occur due to the safety setbacks:

> That is going to be the biggest concern and it does raise the question of as to whether there's a case for compensation in light of this and I don't know where that is at, but it will be a question that is on some people's minds … Because you know there is a risk of the loss of land use in this space and I think that is the last thing farmers want to see happen … So at least there is some clarity on those distances so we know what we are dealing with now, but in terms of the future implications of this there's still some uncertainty around that. (Martin 2020:1)

For Sarah and Taranaki Energy Watch, the decision represents a victory in guaranteeing safety operations and control of how the land around them is managed through regulations. As Sarah expressed in an interview with Radio NZ:

> Our whole premise is around supporting our local communities and being able to establish what it is appropriate for us to be living next door to. For the families it gives them some sense of 'are we safe or are we not' and it also addresses the issues of land use rights. (Martin 2020:1)

[62]Taranaki Federated Farmers supports "farmers in a wide range of situations and partners with a number of other Taranaki organizations and businesses to protect, foster and advance the interests of Taranaki farmers and farming generally" (Martin 2020:1).

The small change is a steppingstone in what Sarah described to me as a journey that won't end until there is more monitoring and transparency from councils and oil and gas companies. There must be a continuous involvement with communities to ensure that they have all the facts and are aware of the information needed to make a conscious decision of whether to allow drilling on or near their property:

Sarah: The only way I keep reaching out to people is that I keep an eye when resources consents come through, through the regional council. Every six weeks they put down what they have consented for and occasionally the resource consent for seismic will come up through there and then I can look at the area where it is going to be and do a leaflet drop to that area to make sure that people know about the information. So, we have done that a couple of times. Also, the regional council didn't use to require a resource consent for either. But now TEW is challenged on that. And they talk legal advice and require a resource consent for it. So, there is a lot of resource consent provided to the regional council now around where they occur and when they occur. It still won't get back to the landowners through the regional council. Because the regional council says it should be not notified. Because people have signed an X agreement under the crown minerals act that is enough agreement. But if you read the CMA, they don't have to tell them that it is going to happen. So, it is…I would feel like…it just feels like the left hand and right hand, that one is doing that, and the right is doing that. And TEW has been trying to move them together. So that we can get the full picture and people very clearly, if you know that they might not go off and you sign for them, that's it. But if you don't know they might not go off and you sign for them… That is hardly fair.

Environmental activism in Taranaki has been growing due to the use of social media platforms, aiding in the organization of gatherings and initiatives as well as creating intergenerational events. The hikoi organized by Kiwis Against Seabed Mining (KASM) included people of all ages from all over New Zealand as well as people from Europe and North America. During the hikoi, I interacted with a few protesters who explained that they had heard about it through posts on Facebook or by looking up through activist group websites such as Climate Justice Taranaki (CJT) or Greenpeace NZ. The web interactions allowed them to gather more information on issues such as climate change, toxic waste, fracking, and offshore extraction. Hendriks et al. (2016:1103) stress that "for many contentious political issues, especially environmental conflicts, social media has become an important stage for discursive contestation where multiple actors seek to shape and reframe meanings over contested issues."

The use of social networking sites are prominent features of contemporary environmental debate and social networking sites (SNS) from Facebook to Twitter have been interwoven "into the digital fabric of households, communities, and organizations around the globe" (Hendricks et

al 2016:1102). SNS have become a communication tool to share, contribute, and create the participation necessary in making information for educating citizens who may not be aware of environmental issues locally and globally, in what Boyd (2010) defines as 'network publics.' Individuals have been able to participate in political issues from the comfort of their house and private sphere, "alone, but not lonely or isolated" (Papacharissi 2010:244). Through this type of engagement, a plurality of self-come together to form a collective identity that transcends place as well as time, allowing individuals from all over the globe to connect in supporting a common cause. SNS have facilitated recruitment of new members, fundraising opportunities, and campaigning activities becoming more than channels of communication to mobilize supporters (Boyd 2010).

Another example of social mobilization through web platforms and its effectiveness in Taranaki is the People's Climate Rally that occurred in March 2017. The People's Climate Rally was a two-day event on March 22nd and 23rd that included peaceful protest, workshops, and entertainment while promoting a world without fossil fuels. The rally campaigned for the end of oil and gas development in New Zealand and promoted an awareness of climate change and the looming catastrophes linked to climate change (Greenpeace New Zealand 2016). A coalition of groups including Climate Justice Taranaki, Frack Free, Oil Free Wellington, Greenpeace New Zealand, and 350 other groups organized peaceful protests and blockades against the NZ Petroleum Conference, a conference held yearly with the aim of promoting exploration opportunities in New Zealand. The conference gathers oil and gas companies and domestic decision makers including the Minister of Energy and Resources, the Ministry of Business, Innovation and Employment, the Taranaki Regional Council, and NIWA. These peaceful protests have often reached an attendance of more than 5,000 people (Greenpeace New Zealand 2016).

*Art and activism: Creative protests and actions toward fracking.* Activists in the region have used different means to protest and create awareness toward the impacts caused by fracking. In 2012, twenty-two Taranaki artists participated in an exhibition called Fracked, a way for each artist to produce a piece and express their view on the controversial drilling technique. In 2017, the initiative repeated through a new exhibition FRACK OFF, a collection of works created by photographers, artists, and writers and scheduled the same week of the Petroleum Conference organized in New Plymouth. The curator of the exhibit Graham Kirk reported:

> I've always felt that artists and writers are like first responders in a time of crisis. They sniff out that things aren't right and they can convey that in their art, as they've done in this exhibition. I have to say, they didn't take any persuading. The unease with which they view fracking was almost universal We know this is the wrong path. We don't want earthquakes or a poisoned aquifer. We don't want Taranaki to become an industrialised landscape. We know that we are privileged to live here. When they hold the petroleum conference in New Plymouth in March, it won't be a case of 'business as usual' in the minds of most Taranaki folk. … If there's one thing that I hope for this exhibition, it's that it might cause people to think twice about what is happening right under our feet and question, is it worth it? (Fuseworks Media 2017:1)

Sze (2015:1) analyzes Anthropocene narratives, discussing how the use of literature and art projects can allow expression of one's injustice, "offer[ing] a potential window into the lack of cultural recognition for the most oppressed and disenfranchised." Grindon (2010:12) writes: "Art can move between the gaps that we can perceive within communities and within the dialogue with experts and policy makers, thus allowing us to highlight aspects and places that are unknown and at risk of irreversible environmental deterioration."

Some of my interviewees who are visual artists in the community as well as being involved in environmental organizations, explained how they have been taking a stance through painting, sculpture, and photography. Fiona says the community's response can be at times disheartening, but she considers what she does a way of keeping a record of the changes she notices around her:

> I exhibit the work and put all the publication of what I am doing. One local came last year and she was the daughter of the neighbor up here because she had been feeding the chickens and she asked me if she could come up here. "Sure, come and see what I do". "I like to see what you do". Nobody else came. The oil industry, they commented at the meeting and said "did you have an oil show?" and I said "what? " did you show photos of us? I said "I actually do more than showing pictures of you guys. My interests are far broader. Don't see that. They see me as the opposition all the time. They don't see it is a record nobody else is doing or they have the same validity of what they are doing.

Community members who support the oil and gas development often referred to activists as part of a "hippie movement" or "not-in my-backyard" form of protest. An engineer working at a consulting firm described his view:

> I know they have been instances where the industry has invited ehm… people to come and and talk and be explained or have the situation explained to.. but I haven't heard that is even worth well…I mean… certainly my personal experience of people talking about

> energy and energy supply…often don't understand or talk the language of the industry. They don't even come across as credible. Which is incredibly unfortunate. When you think that on this side of the table you have people with suits, with PhDs, Masters degrees, seismic engineers and petrophysists. And on this side you've got a bunch of people in T-shirts and jeans… of course generalizing… complaining about situations when they may not have all the information to make an objective assessment.

The term 'not-in-my-backyard' (NIMBY) has been used to identify a genre of activism based on "protectionist attitudes of and oppositional tactics adopted by community groups facing an unwelcome development in their neighborhood" (Dear 1992:179). NIMBY activism has been described as the epitome of eco-democracy (Schively 2007:263) and grassroot empowerment. Critics use the term in a disparaging way, accusing communities that adopt this form of activism of blocking necessary development for the common good or opposing progress desired by the majority. Mihaylov and Perkins (2015:143) state:

> NIMBY groups are depicted as ill-informed, ignorant, irrational and alarmist. We can see that these two characterizations depict NIMBY activism as anti-modernist from the modernist perspective of rational, science-driven, national-scope institutions.

Critics assume that the opposition is based on irrational fears and ignorance of the facts, what has been described as an 'information deficit' perspective (Owens 2001). Based on this view, "if the 'facts' of the issue could be separated from the 'myths' … then levels of opposition should fall" (Devine-Wright 2009: 432). Scholars and local activists have pointed out that a political label has been attributed to NIMBY and several qualitative studies (e.g Petts 1997; Bell, Gray, & Haggett 2005; Gross 2007; Upham & Shackley, 2006) have shown that individuals opposing developments are:

> often highly informed and cannot be presumed ignorant … Furthermore, the value of the self-interest explanation has been contested … since it is based upon rational choice presumptions that overlook the importance of issues of justice, equity and trust in energy conflicts. (Devine-Wright 2009:431)

Despite the NIMBY label having acquired new nuances in recent years, the label "can be almost as undesirable as the local disruption" (Mihaylov and Perkins 2015:144), pushing a community to shut down their activism to avoid such accusations. Some of my interviewees have publicly faced these accusations from regional councils and representatives as well as privately from close friends and relatives. Sarah states:

> At some point in the newspaper they labeled my husband and I and a friend of ours, vexatious and mischievous and that we were very difficult. And that was the front page newspaper.

Other activists and community members involved in grassroot movements have pointed out that the words used by the opposition often invalidate a simple caring attitude toward the land and a developed spirituality. This lack of a caring attitude has at times created a sense of powerlessness and affected the growth of small grassroot movements such as CJT. Margaret said:

> I think it is a lot of things that influence people inactions. We are a small activist group in Taranaki. I don't see it growing. It hasn't grown in the time I have been watching it. Still small. I don't see many people at Climate Justice events. How many people are coming out tomorrow? And I think one of the things is that…we feel powerless. I think another thing is the attitude towards the land. The farming all around us it is chemical farming that thinking that land is a commodity you use and make us much many you can in your lifetime and even that you are thinking and many people are influenced by multinational companies from which they are getting lots of their products. [unclear] A family member was talking about bringing up the idea of organic farming but they don't want to hear anything about it. Some of these people are benefitting by chemical fertilizers companies or subsidized by that and there is some attitude about being organic, and caring for the planet as some weirdos hippies and strange person. I dare of me of thinking of Papatuanuku feeling the pain of fracking. And that was what pissed my friend of in our conversation over the issue. Because she couldn't relate of me having a spiritual connection to the land.

## Reflections: The Blurred Line Between Activism and Anthropology

> **Fieldnote (edited), 12/2017**: A couple of days ago I got asked if I wanted to take part in the annual Christmas parade held in Okato. C. explained to me how CJT members and other friends/neighbors have participated in the last years to bring awareness on the impacts of climate change, fossil fuel consumption, and use of alternative forms of energies. In preparation for it, I was reluctant at first, as I am still struggling on the level of engagement. Would I be considered an activist as well and that will be more difficult to get contacts with people with opposing views? I helped with some of the signs and banners. The parade was successful, and many people showed up. A small but variegated float. CJT members and supporters drove around with an electric vehicle and kids and parents joined them walking beside it, wearing signs and chanting**.** It was another way of protesting on things one wants to change in the region and it sent the message of an activism that can include members of different age groups, gender, and life experience.

In the course of my research, I often found myself reflecting on my role and how thin the line can be that separates research involvement from more activist participation. Listening to

conflicting opinions and views is done by maintaining an open mind even in moments of disagreement with what was heard. However, an absolute objectivity is illusory and impossible to achieve in every aspect of one's ethnographic research. An emotional connection within it is inevitable as “anthropology is inherently empathetic” (Willow and Yotebieng 2020:2). The process establishes relations and rapport with interviewees and their stories and thoughts shape one’s perspective: “anthropologists become the hybrid sum of life experiences that integrate not only their (often relatively privileged) upbringings and identities, but also the life-changing revelations catalyzed by their fieldwork encounters” (Willow and Yotebieng 2020:3).

The fear of making mistakes and creating a distorted analysis of what I observed and learned from conversations with my interviewees was driven out by my clinging to a reflexivity, which “allows for more nuanced and productive understandings of different sides of issues in which activists engage” (Willow and Yotebieng 2020:3). The words and ideas expressed during long conversations in front of a cup of coffee or sitting on stone steps in an open field where sheep were grazing remained suspended in a web of meanings that one can try to untie. As Warren (2006) expressed, a discipline such as anthropology encourages a critical view of one's role and “anthropologists often emerge profoundly sensitized to the power differentials that set their own daily realities apart from the lives of the ‘others’ upon which they build their careers. Anthropology’s intrinsic reflexivity positions its practitioners to overcome many of the ethical quandaries associated with research in today’s most challenging contexts” (Willow and Yotebieng 2020:3).

The important thing is not to focus on one's own conceptualizations but avoid allowing “biases to dictate procedure” (Still 2020:74), guaranteeing an equity in the exchange of knowledge. However, confusion of one's role is often inevitable, not necessarily dictated internally by us but questioned by those not accustomed to ethnographic work. There were many questions posed by both activists and oil and gas supporters: Are you an activist too? Which side are you on? The risk is having to face difficulties in speaking with those who are against certain forms of activism, and, driven by their own biases, avoid a dialogue with those who think differently. These questions often put me in an internal struggle: Do I express my view? Would this compromise my research, making it difficult for some people to approach me? At the same time, I thought: Why do I have to choose one role over the other, and what harm is there in identifying with both? My thoughts echoed those of Willow and Yotebieng (2020:3) who said:

Because our research regularly acquaints us with people who endeavor to build a better world for themselves or for others, we inevitably confront queries about where we stand. When we are asked if we are anthropologists or activists, it is often implied that being more of one detracts from our ability to be both.

# CHAPTER EIGHT: CONCLUSIONS

Walking the trails at the Te Papakura o Taranaki, the clouds that surround the peak of Taranaki Mounga seem to be slowly disappearing. Around me, the sound of the water running is becoming louder. I follow David leading the way to Dawson Falls. We trek for about an hour, crossing a small, suspended bridge over the canopy and resting near the rocks and freshwater running over them. Around us, the characteristic calls of colorful birds can be heard. This sound is occasionally broken by the voices of tourists passing by and the nervous laugh of children and teenagers jumping into a natural tiny pool created by the hollow of the rocks.

A picture-perfect place is hard to forget, and it makes one wonder about the many contradictions of this region—contradictions that I have heard through the voices of my interviewees and discussed in this dissertation. I consider landscapes of hills, waterfalls, mountains, rivers, lakes, and ocean, as opposed to areas where the passage of the oil and gas industry is visible through well sites, production stations, drilling rigs, and road construction.

In this dissertation, these contradictions emerged through the conversations with my interviewees: from community members to activists, engineers, and experts. Using the voices of those I spoke with, I learned about the complex dynamics between the diverse members of communities living in the Taranaki area. Those affected by of oil and gas exploration activities explained their opposing views toward fracking, addressing a series of health and environmental impacts that have affected their farming activities and daily lifestyle. As a result, several people reported a personal disconnect from their community: either because of a new or awakened activism that pushed them to try to make things better while going against the mainstream culture of oil and gas industry acceptance; or, a disconnect because of detachment to the land and desensitization to the extractive practice. “Out sight, out of mind” was a recurring phrase explaining this latter attitude: when one does not want to suffer due to what is around him or her, it becomes a convenient human response to unsee or pretend not to see what is happening.

## Fracking and Fractures in the Social Fabric

For my research questions on how the presence of extractive practices—in particular fracking—have shaped the relations within and among different communities, and what strategic countermeasures have been adopted by local communities in response to the environmental and social impacts brought by fracking, I identified emotions and reactions that led to an accentuation

of the social fractures already occurring. Protests and environmental actions taken by non-profit organizations and grassroots movements as well as the court and legal appeals were ongoing during my fieldwork. These responses were borne out of dissatisfaction and the shared experiences of people who felt unheard or ignored by the regulators and legislators. Their requests were to have more information and monitoring of the activities, more transparency from the companies and regional councils, and to have a consultation process carried out not as a formality, but in order to reach a common understanding. Alternative views are held by those engineers and experts who see the petrochemical industry as bringing more positives than negatives to the region. It must be acknowledged once again that communities are not homogenous groups, and that there is a spectrum of nuances within the views of their members. Some of the engineers, oil riggers, and other workers affiliated with the petrochemical sector acknowledged and raised their concerns on the impacts and negative consequences fracking can have on the environment and people. In some cases, interviewees who had been employed for years in the sector later changed their perspectives. Observing the negative impacts brought them to develop ambivalent feelings toward the industry and consequentially led them to decisions to change their careers. Others asserted that the industry, like any other anthropocentric activity, brings a series of positives and negatives, pointing out that the positives outweigh the negatives.

Regulations and policies can be implemented and improved, and as discussed by the Parliamentary Commissioner for the Environment (PCE), creating a national-level regulating body was a step seen by some participants as moving toward a possible solution to the many problems reported during my fieldwork. However, the aim of the dissertation was not to make any policy recommendations, but to unveil problems and struggles experienced by communities, putting their voices on the foreground using ethnographic methods. As Perry (2012), Willow (2014), and De Rijke (2017), have demonstrated in their work:

> Ethnography offers a way to collect data on the cumulative impacts of industrialization and chemical pollution on local communities. … The close bonds and sometimes long-term engagements that ethnographic researchers have with the communities where they conduct fieldwork makes this approach to documenting localized changes in psychological, sociocultural, and environmental stress levels through time a valuable contribution to cumulative impact assessments (Perry 2012:47)

As I established relationships and built rapport through the days and weeks of fieldwork, I understood more and more the struggles and limitations of the ethnographer. Listening to the

stories of those living close to the well-sites and production stations and the social impacts they experienced, my participants and I often shared tears and sorrow for what they had to face and how they wished they had a better understanding of the practice itself. Anger, anguish, a sense of injustice, and a loss of connection with others were common themes discussed in this project. Nonetheless, in those moments a glimmer of positivity still shone through, along with the desire to gain back some sense of control over the environmental and social degradation that has been occurring in the region. Interviewees recounted how the social fractures they lived were at times unavoidable, as they decided to take a different stance from the mainstream approach existing in the region. As Sarah expressed to me:

Sarah: I was accused of turning on my own kind. Both the Council and people in the community accused me of that.

Anna: Did you lose any connections?

Sarah: I lost few people. But generally speaking, if you talk to people off the record with anything to do with the oil and gas and anything to do with the council, they will agree that it is too hard for them to say what they think. In a community where a lot of the workers generated from oil and gas, or they know of people, for people to talk about it to express themselves freely is an issue. Because they have people work in those industries, it becomes very very very challenging. And because it has been here for such a long time. I feel there is a lot of people out there who are not able to easily talk about it. It brings too much…

The political decisions and projects supported through the years by previous coalitions and governments have deeply influenced and contributed to nurturing a culture that favors petrochemical extraction processes in the region, rather than addressing the need to shift to other forms of energy. Taranaki has been considered the center of oil and gas in New Zealand for more than a century and it was evident to the majority of my interviewees that oil and gas has become ingrained in aspects of their culture. Therefore, it is difficult for many to completely 'unsee' it as a presence in their future. This influence was not just evident in the landscape through infrastructure and buildings (a noticeable presence of the passage of the oil and gas industry) but also visible in the material objects that are celebratory of oil and gas activities such as drilling bits found as doorstops outside the Taranaki Regional Council building or decorations on walls and in offices. These elements represent a way to showcase the work of those who positively describe the industry by focusing on the positive attributes such employment opportunities, development of business, support of festivals and events, and construction of residential areas.

Some interviewees acknowledged the need for an exchange of data and perspectives: working together, rather than against one and another. Distrust and transparency were common concerns in interviews. Local farmers and landowners who had negative experiences with the companies on their land stressed that they often did not receive a complete picture of the activities that would be carried out on their property. Before the involvement of not-for-profit organizations and grassroots movements, many were unaware of how signing certain agreements with representatives of the industry would result in binding contracts that were hard to break. In this case, as argued in Chapter Seven, the use of online platforms and active mobilization through means beyond word of mouth, helped to disseminate knowledge that for some were not clear or easy to find. By comparing worldwide information people have asked for more in-depth scientific discussion and research as a way of negating irreversible damage to both their land and their health. As participants like Fiona, Mike, and David pointed out to me it is research ongoing and growing and as Sarah expressed to me "I still haven't understood all of it. It is such an evolving story."

Some of the engineers and experts stated that industry detractors are misinformed and overreacting because the information on which they base most of their protests comes from studies or from documentaries and NGO organizations that originated abroad such as Greenpeace. According to the oil and gas supporters, the research would not apply to Taranaki, as fracking is conducted differently in the region with stricter regulations and at a deeper layers when compared to countries like the United States. This reaction is understandable considering that each company operates differently within different countries following different standards and rules. However, knowing that companies have been reluctant to disclose the exact chemical compositions of fracking fluids due to commercial confidentiality, I understand the level of mistrust experienced by community members and activists. I was often puzzled by the dismissive attitude adopted by councillors, industry leaders, and managers, that while not pervasive, still lingers and affects the way interactions occur with the opposing groups within the communities.

## Uncertainty, Confusion, and Senses of Place

While exploring the community experiences of fracking, I investigated the feelings hydraulic fracturing evoked through an interview and ethnographic process by considering the way people engage with their landscape and place. Place, for many, resonated, as synonymous

with home, family, and belonging to the land. Māori values were strong and deep for several community members, and even some who identified themselves as Pakeha drew heavily on Māori teachings in expressing their association with their homeplaces. The ancestral connection to the landscape was an essential component of their descriptions of their connections to the land, and the Māori interviewees assert their positions as *kaitiaki, or* guardians of the environment. Some interviewees mentioned the need to protect Mother Earth, Papatūānuku, and held a sense of stewardship that brought many to feel compelled to stop the environmental degradation occurring before their eyes and caused by the industry. Landowners, farmers, and residents living near areas where drilling and fracking had been more intense, such as Tikorangi, Stratford, and Ngaere, described their state of uncertainty and fear, often interwoven with feelings of anger, anguish, and sadness when pondering how their home had been modified through the years.

The presence of the industry and fracking operations has brought many to alter the way they interact with their space. As other ethnographic studies have shown (see Perry 2012; Jacquet 2014), the environmental degradation and the impacts to the health and wellbeing reported by many of my interviewees created what can be described as a trauma to the collective psyche and social structure:

> This often insidious damage … involves many factors, including actual aesthetic damage to the landscape; removal of valuable resources (often without long-lasting benefit to the community); erosion of socioeconomic base and tourism; destruction of historical, heritage, and sacred sites; a sense of loss of control (e.g., loss of land or livelihood); and a sense of being bullied by the government and the industry. (Hirsch et al. 2018:9)

The loss of that "peaceful rural view" associated with rural land brings with it an array of psychosocial impacts and health concerns (Hirsch et al. 2018:7). Concerns include contamination, toxins, immunological reactions to pollutants, cancer, and problems in child's development (Hirsch et al. 2018). Interviewees living near fracking operations have described a range of health problems: from the aggravation of previous health conditions to asthma, skin rashes, and recurring forms of tumors. However, to better understand the health consequences and implications brought by fracking in this region, long-term and systematic epidemiological studies are still required. Many of those who reported these problems indicated this lack in our conversations. In my study, it surfaced how there is a stigma when discussing their health problems likely connected to fracking. Some do not feel comfortable discussing health issues fearing not being believed, and/or being dismissed, isolated, or even 'ostracized' by their social

groups. Others are not entirely sure whether their conditions have been caused by fracking fluids and processes. There is a sense of pride mixed with a reserved attitude that can lead many to omit any health issues that could have been caused by the increase in fracking activities. They feel responsible and ashamed for having brought it on themselves by consenting to companies operating on their land or near their neighbor's land.

Interviewees also discussed their future and existential concerns when thinking about the connection with their land. Many expressed their state of uncertainty, confusion, and anxiety. What would happen to future generations if irreversible changes to the landscape were to occur? Would they be able to experience the place and the land the same way, taking advantage of its beauty and what it has to offer? These questions have brought people to adopt one of two strategies: a reaction and active mobilization to stop or reduce the negative impacts experienced in their landscape, or the embracing of a detachment from the territory. Out the 27 community members I interviewed, 21 of them expressed negative experiences with fracking. Community members such as Sarah, David, Mike, and Margaret expressed to me how they had moments where they experienced a detachment or a disconnection with the land, and Abbie linked this to the notion of *solastalgia* (Albrecht 2003), a word that best encompasses the many emotions expressed when pondering about her relationship with her land. A lack of joy and happiness prevailed as changes occurred around their home. This solastalgia included feelings of helplessness and hopelessness. Many have chosen a self-defeating attitude to the changes experienced, perhaps as a coping mechanism to protect their emotional and family wellbeing, and to not let the deterioration erode their 'self' too deeply.

Deterioration that connects to the concept of deterritorialization (Garcia Canclini 1995) is another theme that emerged in the discussion of the sense of place. Deterritorialization goes beyond the physical environment and also impacts cultural life. The deteriorating landscape has brought many to lose a natural relationship with the territory, consciously and unconsciously. Several of those I interviewed at first dismissed the idea of a loss of connection yet later on declared that through the years the slow expansion of the oil and gas industry caused them to internalize the changes and avert their eyes and their mind as a way of not fully accepting the transformation.

In other cases, people exposed to the degradation had an opposite reaction to the changes occurring around them and began to be involved in grassroots organizations, environmental

protests, and events. Their sense of attachment to the land became stronger and deeper, compared to the superficial view they once held. In this reaction, the feeling of optimism was pervasive: they spoke of a future that could be still improved, modified, and where the collective efforts, even when from a small group of community members, could be bring those positive changes.

When listening to oil and gas workers, managers, engineers, and collaborators in the sector, the discussion around a sense of place shifted. Many did not see the environmental degradation caused by the extractive activities as an aspect capable of modifying their sense of place. They addressed how working in the industry fortified their connection with the land and they felt the industry had brought mostly positive changes to the region. Some pointed out that people should begin to trust the companies and their operations, instead of condemning every decision taken as toxic to the community. To the question on whether they would feel comfortable living near a production station, a drilling rig, or any fracking infrastructure, the atmosphere and reaction changed. Several said that they will never make such a decision and if a company would consider exploring near the property, they would only agree to give consent to their own company but reject signing any agreement with others.

## Risks and How They Are Experienced

My research question on how risk is experienced and determined by the different groups and members across the Taranaki region, elicited a diverse range of perceptions about the degree and nature of the risks encountered, and a number of different approaches to risk. Living with risk, however evaluated, perceived, or characterized, leaves real and concrete effects. There are different reactions of individuals within and among communities when facing certain events or weighing the probability that untoward or calamitous events might occur. Each community member has their interpretation of the risks and evaluation of which risks are considered more dangerous or less dangerous, based on their own conceptions as well as those suggested by the social and cultural context.

Risk was felt differently by engineers and oil and gas workers versus community members. Oil and gas professionals often pointed out how community members and those not involved in their sector overestimated risks. They expressed that for them the risk of injury during operations was an aspect always in the back of their mind. In contrast, the possibility of toxic substances leakage into the aquifer system was described as remote and only occurring

under exceptional circumstances. These descriptions resonate with a psychometric approach on the analysis of risk and the idea that ordinary people either overestimate or underestimate the categories of risk they are exposed to daily and consider less probable events as more likely to occur.

The first time some of my interviewees discovered that hydraulic fracturing operations had been carried out near their property or in their village they were baffled that this could be happening in Taranaki. The belief was that conventional ways of extracting oil and gas were the main procedures, which had been done for more than a century and therefore all the associated risks associated were known. Many felt shattered and betrayed. They believed that the Taranaki Regional Council exerted strict control on all the activities and that the council would not risk the landscape, its flora, its fauna, and its beauty through this controversial practice.

Experts are seen as crucial players in shaping an individual's identity on perception on risk. Through information, studies, and research, experts can strategize risk and convert it into a regulatory power with the aim of monitoring, without imposing but allowing for a normalization of certain suggestions and behaviors people should adopt to keep safe. As an individual becomes more informed, he or she is capable of self-governance 'unconsciously' following the behaviors suggested by the expert. Several interviewees who had been exposed to the impacts of the fracking operations due to its close proximity to their respective land holdings, started to document and independently learn what kind of risks and consequences were possible. On one hand, this led them to increase their scientific knowledge and consequently to question the regulation and management of risk, as suggested by experts, by institutions, and by the government. They also faced a collapse of what they had held as true up until that point. Many started to challenge the rules and regulations that had previously been accepted, challenging the experts' opinions. To some people the experts were no longer seen as fully reliable and as influenced by the political atmosphere engendered by the oil and gas industry, which was perceived to be covertly regulating and managing the risk in a way that favored oil and gas.

## Future Steps and Reflections

> **Fieldwork note (unedited), 4/2019:** As the plane prepared to take off, I gazed out the window of the twin-engine aircraft and looked at the runway. The hot afternoon of a late

> summer day created that optical effect on the asphalt that makes looks it like shimmering water. I questioned myself about my own sense of place and the ideas I had investigated for the past five months. What is my sense of place? No answer. I understood the difficulties of my interviewees to articulate their words and pinpoint their connection to the land and make sense of it—A struggle that is due to the rapid changes that one is often subjected to and can't have any control over. Would perhaps my questions on that topic have led them to ponder more on what it is their sense of place in the weeks, months, or even years to come? Maybe this would have created a change in their views/perspectives? And for those who dismiss or diminish the risks of fracking, would our conversation perhaps push them to see everything through a different lens? Maybe.

This study represents a snapshot of a region that has a surface area of 7,258 $km^2$ (compared to the province of Alberta, which covers 661,848 $km^2$), and a population of fewer than 125,000 people. The nuances of perspectives and views are various and not necessarily bound to remain as I had collected them during my fieldwork. I believe that any landscape visited and any encounter I made would be subject to change, even if subtle, making it impossible to keep the same feeling over time. This feeling regarding place and experience is not linear, but rather follows an undulatory movement and echoes the Greek philosopher Heraclitus's teachings: *Panta rei:* a man cannot step into the same river twice. Place cannot be considered a static idea. To understand in depth a sense of place and belonging and how it has changed (or not) through time, the perception of risk, and the impacts associated with fracking, requires a deeper phenomenological and narrative analysis returning to the same place and those same people encountered.

The future of energy and its landscape is changing in Taranaki, and so will this research. Continuing to ethnographically investigate the socio-cultural and environmental impacts of extractive practices from both past and present accounts will allow the avoidance of certain mistakes and situations as new projects and challenges develop in the region. I want to conclude with a Māori whakataukī, a gentle reminder for anything the future will hold for Taranaki, with the hope that these words are not forgotten:

Manaaki whenua, manaaki tangata,

haere whakamua

*(Care for the land, care for people, go forward)*

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# APPENDIX A: INFORMATION LETTER AND CONSENT FORM

INFORMATION LETTER and CONSENT FORM

**Study Title:** Exploring the socio-cultural and environmental impacts of hydraulic fracturing within the communities of Taranaki region, New Zealand.


Research Investigator:
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My name is Anna Bettini and I am graduate student in the Anthropology department at University of Alberta, Edmonton, Alberta, Canada. I am engaged in this research project as part of the requirements for my Doctoral degree. The objective of my project is to understand the socio-cultural and environmental impacts of hydraulic fracturing in Taranaki, New Zealand, and the dynamics created within communities toward this specific extractive practice. I would like toexplore the changes that have been occurring in local traditional knowledge, the possible health problematics that may have been arisen and affected community members, and how local land and natural resources management strategies have adapted to this extractive practice, consideringelements of possible environmental degradation.

As a member of the Taranaki community, I am reaching out to you as you have expressed interest to take part in the study.

If you are participating in the interview session this would be of the duration of approximately one hour at a place and time that is mutually agreeable to both of us. I will audiotape our discussion, and transcribe the information myself. You can decline from answering any questions, and you can withdraw from the interview at any time. Should you choose to withdrawearly, you can decide whether or not I can use the information you have provided to that point.

If taking part in focus groups, it is important for you to know that the group will be formed of 4-5 other participants selected on the basis of similar interests/occupation and/or age, and time commitment would be of 1.5- 2 hours in length. During the study, confidentiality will beachieved

by making sure that identifiers such as vernacular terms, names, geographical cues won't be used by the main researchers and participants when referring to each individual when ina group.

If being involved in the participant observation sessions, this will consist of the main research toobserve daily activities/events in your community that relates to the the current research.

In all the sessions above, it is important for you to know that pictures and/or videos as well assound may be recorded by using my own equipment.

The project poses minimal risk to participants since some of the questions address home life,political views, societal attitudes and personal opinion.

Forms of dissemination may include articles in books, academic journals, presentations atconferences/workshops, website publications and classroom presentations. I will provide participants with a soft copy of the completed thesis upon request.

As participants, the proposed research will give the following benefits: having a better understanding of the impacts that hydraulic fracturing has on the community you are inhabiting;give an opportunity to explore more in depth aspects that are related to the connection you have with the landscape; gain more knowledge in relation to your region and the impacts of extractivepractices.

No cost is involved in taking part in this project.

I will store the data securely and will keep all information indefinitely in the event I continue research on this topic. Should I continue my research I will acquire your re-consent to use the data in new ways. If the study is discontinued, I will destroy the data. Any material shared withme will only be used with the individual's permission.

You are under no obligation to participate or continue your participation in case you decide to doso. and/or you are not obliged to answer any specific questions even if participating in the study. Participants can also decide whether they want to be identified in the results section of this study.

You will be able to opt out without any penalty and ask to have any collected data withdrawn from the data base and not included in the study. Participants data can be withdrawn up to three months to data collection. Withdrawal from the study will be done by explaining and advising people that they can express at any given time their intention not to talk anymore ad be silent or walk away. Full or partial withdrawal can be done in whole in part at any time during the study.

My supervisor is Dr. Andie Palmer. Her email address is apalmer@ualberta.ca. Please feel freeto contact her if you have any questions about the project or about me.You may reach me at: bettini@ualberta.ca Or, by telephone at: 7808075769 (Canada)

**Consent Statement**

I have read this form and the research study has been explained to me. I have been given the opportunity to ask questions and my questions have been answered. If I have additional questions, I have been told whom to contact. I agree to participate in the research study described above and will receive a copy of this consent form. I will receive a copy of this consent form after I sign it.

| _____ | _____ |
| --- | --- |
| Participant's Name (printed) and Signature | Date |
| _____ | _____ |
| Name (printed) and Signature of Person Obtaining Consent | Date |

# APPENDIX B: LAWS GOVERNING ONSHORE OIL AND GAS EXTRACTION IN NEW ZEALAND

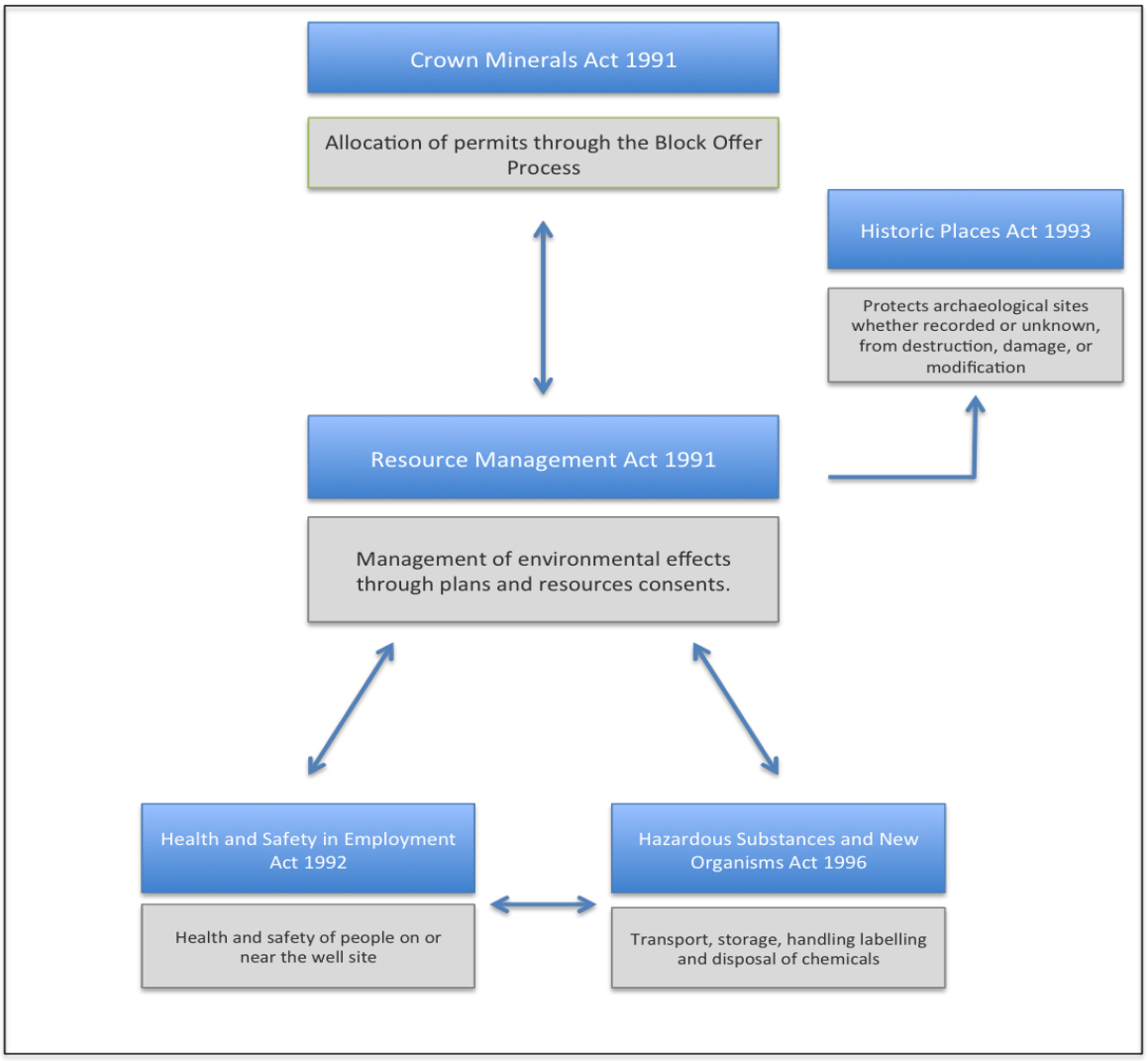


*Figure 28: Five main laws governing onshore oil and gas extraction in New Zealand*

Adapted from: Parliamentary Commissioner for the Environment (PCE). 2014. Drilling for oil and gas in New Zealand.

# APPENDIX C: MEANING OF TIER 1 PERMIT AND TIER 2 PERMIT [63]

(1) **Tier 1 permit** means the following permits:

**(a)** a prospecting, exploration, or mining permit that relates to petroleum:

**(b)** a prospecting permit that relates to a mineral listed in the first column of Schedule 5, unless the permit relates to prospecting for alluvial gold:

**(c)** an exploration permit that relates to a mineral listed in the first column of Schedule 5, unless the expected total work programme expenditure in relation to the permit for the final 5 permit years of its life, or for the entire duration of its life if the permit is for less than 5 permit years, is, in the Minister's estimation, less than the amount specified for the mineral in the second column of that schedule:

**(d)** a mining permit that relates to a mineral listed in the first column of Schedule 5, if, in any 1 permit year in the next 5 permit years of its life, the annual royalty or annual production in relation to the permit will be, in the Minister's estimation, equal to or more than the amount specified in the third or fourth column of that schedule:

**(e)** a permit that (irrespective of the type of mineral to which the permit relates, the year of the permit's life, or any threshold amounts specified for the mineral to which the permit relates in Schedule 5)—

**(i)** relates to an underground operation or an operation that is (whether wholly or partially) 50 metres or more beyond the seaward side of the mean high-water mark; and

**(ii)** is not for a special purpose mining activity.

(2) In this Act, **Tier 2 permit** means a permit that is not a Tier 1 permit.

(3) For the purposes of the Minister making an estimate for the purposes of subsection (1)(c) or (d), the life of a permit includes any extensions of duration to the permit granted under this Act.

[63] New Zealand Legislation 1991. Resoruce Management Act 1991 No 69- Section 2B: inserted, on 24 May 2013, by section 10 of the Crown Minerals Amendment Act 2013 (2013 No 14).

# APPENDIX D: FRACKING OPERATIONS IN THE TARANAKI REGION

The following tables outline all the fracking operations that have occurred in the region prior to 2012, as reported by the Parliamentary Commissioner for the Environment

| Latest frack | Site | Company | Depth (m) | Notes |
|---|---|---|---|---|
| 1989 | Kaimiro-2 | Petrocorp Exploration | 1300 | |
| 1990 | Kaimiro-3 | Petrocorp Exploration | 2000 | |
| 1993 | Kapuni-15 | Shell Todd Oil Services | 3600 | |
| 1993 | Kaimiro-1 | Petrocorp Exploration | 3600 | |
| 1995 | Kapuni-8 | Shell Todd Oil Services | 3400 | |
| 1995 | Kapuni-6 | Shell Todd Oil Services | 3500 | |
| 1997 | Mangahewa-2 | Fletcher Challenge | 3500 | Fracked 3 times |
| 2000 | Ngatoro-9 | NZ Oil & Gas | 1500 | |
| 2001 | Ngatoro-7 | NZ Oil & Gas | 1500 | |
| 2001 | Rimu-A2 | Swift Energy | 3800 | Fracking fluid was diesel based |
| 2001 | Rimu-A3 | Swift Energy | 3500 | Fracking fluid was diesel based |
| 2002 | Ngatoro-1 | NZ Oil & Gas | 1600 | |
| 2002 | Rimu-A2A | Swift Energy | 3500 | |
| 2003 | Kauri-A1 | Swift Energy | 3300 | Fracking fluid was diesel based |
| 2003 | Kapuni-5 | Shell Todd Oil Services | 3400 | |

| | | | | |
|---|---|---|---|---|
| 2003 | Rimu-A1 | Swift Energy | 3500 | Fracking fluid was diesel based |
| 2004 | Kauri-E4A | Swift Energy | 2400 | Fracking fluid was diesel based |
| 2004 | Kauri-E5 | Swift Energy | 2400 | Fracking fluid was diesel based |
| 2004 | Kauri-E3 | Swift Energy | 2500 | Fracking fluid was diesel based |
| 2005 | Kapuni-4 | Shell Todd Oil Services | 3300 | Fracked 3 times |
| 2005 | Kauri-E1 | Swift Energy | 2400 | Fracked in 2003 and 2005; fracking fluid was diesel based |
| 2005 | Kauri-E7 | Swift Energy | 2400 | Fracking fluid was diesel based |
| 2005 | Kauri-E9 | Swift Energy | 2400 | Fracking fluid was diesel based |
| 2005 | Kauri-A4 | Swift Energy | 2400 | Fracked in 2003 and 2005; fracking fluid was diesel based |
| 2005 | Manutahi-A1 | Swift Energy | 1100 | Fracking fluid was diesel based |
| 2005 | Manutahi-B1 | Swift Energy | 1100 | Fracking fluid was diesel based |
| 2005 | Kauri-E2 | Swift Energy | 2400 | Fracked in 2003 and 2005; fracking fluid was diesel based |
| 2005 | Cardiff-2A-ST1 | Austral Pacific | 4000 | Fracked 3 times |
| 2006 | Turangi-1 | Greymouth Petroleum | 3400 | Fracked 3 times |
| 2008 | Turangi-3 | Greymouth Petroleum | 4000 | Fracked twice |
| 2008 | Turangi-2 | Greymouth Petroleum | 3400 | Fracked 3 times |
| 2009 | Kowhai-A1 | Greymouth Petroleum | 3700 | Fracked 4 times |

| | | | | |
|---|---|---|---|---|
| 2010 | Mangahewa-6 | Todd Energy | 3900 | Fracked 4 times |
| 2010 | Cheal-A7 | TAG Oil | 1700 | |
| 2010 | Radnor-1B | Greymouth Petroleum | 4400 | |
| 2010 | Cheal-B3 | TAG Oil | 1700 | |
| 2010 | Cheal-BH1 | TAG Oil | 1700 | Fracked 5 times; horizontal well |
| 2011 | Kapuni-18 | Shell Todd Oil Services | 3700 | Fracked 6 times |
| 2011 | Waitui-1 | Todd Energy | 4300 | |
| 2011 | Kaimiro-2 ST1 | Greymouth Petroleum | 3600 | |
| 2011 | Mangahewa-4 | Todd Energy | 4000 | Fracked 2 times |
| 2011 | Onaero-1R | Greymouth Petroleum | 3400 | |
| 2012 | Turangi-4 | Greymouth Petroleum | 3400 | Fracked 6 times |
| 2012 | Mangahewa-11 | Todd Energy | 4000 | Fracked 3 times |
| 2012 | Mangahewa-5 | Todd Energy | 3400 | Fracked 2 times |

*Table 10: Fracking operations prior to 2012*

**Adapted from**: Parliamentary Commissioner for the Environment (PCE). 2014. Drilling for oil and gas in New Zealand: Environmental oversight and regulation. New Zealand government, Wellington