

# CULTURAL VIEWS, PERSPECTIVES AND OBSERVATIONS OF THE HEALTH AND WELLBEING OF THE ROTORUA GEOTHERMAL SYSTEM

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**Keywords:** Rotorua, Māori, mātauranga, mauri, cultural,

## ABSTRACT

Te Ahi Kaa Roa are a collective of representatives from the hapū and iwi who have maintained continuous occupation of Ōhinemutu, Whakarewarewa and Ngapuna villages in Rotorua since pre-European times.

Ahi Kaa refers to the ‘burning fires of occupation’, and the whānau who reside in these villages have a long and unique relationship with the geothermal resources, features and activity around them. Each geothermal tāonga or feature is named and ‘known’, in terms of their characteristics, behaviours and perceived personalities. Their mātauranga, which includes intergenerational knowledge, is built upon sensory-based tohu or indicators.

Council has legal requirements and obligations to Māori under the Treaty of Waitangi, Resource Management Act 1991 and Local Government Act 2002. Because of their intergenerational knowledge and experience, Bay of Plenty Regional Council (Council) initiated the establishment of the group as one way to enable and ensure a tangata whenua lens or perspective regarding the management of the Rotorua Geothermal System and that mana whenua are afforded a clear voice in the review of the Rotorua Geothermal Regional Plan (Doorman, Bhana & Camburn, 2020).

While not the sole focus of the group, a key output of this relationship has been the collation of cultural views, perspectives and observations of the current health and wellbeing of the Rotorua Geothermal System. This paper focusses on this aspect of the groups work acknowledging that their involvement in Council’s process and aspirations for the management of the Rotorua Geothermal system are broader.

While there are similarities in what is measured in cultural and contemporary terms (e.g. behaviour of geothermal features), the Māori worldview highlights that the environment and all it sustains (including people) is interconnected and cannot be looked at in isolation.

There has been a significant change in geothermal use and management over time by tangata whenua due to the intergenerational impacts of colonisation and resultant loss of control over their natural resources. Subsequent land use and development within the city, and the bore closure programme in the 1980s have occurred without iwi consent or input.

Te Ahi Kaa Roa hope the knowledge and mātauranga shared as part of the current work with Council will help to inform future management and monitoring of the system.

## 1. CONTEXT

### 1.1 Intergenerational use of geothermal resources

The hau kāinga (Māori communities that have continuously occupied an area) of Rotorua’s geothermal areas have lived with, and amongst, geothermal activity for hundreds of years. It is evident that initial settlements were selected due to the presence of geothermal activity, which enabled the use of:

- hot pools for bathing, relaxation and healing (e.g. treating ailments such as rheumatism, eczema).
- boiling pools for cooking and to prepare flax for weaving.
- hot ground for cooking, heating and growing crops.
- mud, from some pools, for medicinal purposes.

All of these uses remain today.

According to the hau kāinga, the Rotorua Geothermal System is not just a resource, it is a tāonga<sup>1</sup> and a source of pride and cultural identity.

The use of geothermal tāonga has always been for communal benefit, providing for people’s collective cultural, social and economic wellbeing. Geothermal tāonga used for bathing, home heating, healing, and cooking provides for the health and wellbeing of whānau, hapū and wider communities.

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<sup>1</sup> taonga are prized and protected as sacred possessions of the tribe. The term carries a deep spiritual meaning and taonga may be things that cannot be seen or touched.

It is part of their everyday lives, an essential component of social connectivity and a means of sharing knowledge:

*“Besides the warmth provided in the winter months, the baths also provided a sheltered place to relieve ailments, gather and talk or debate about community politics within the tribe, gossip about people and events, and share stories and traditions from bygone days.” (Manley, 2019)*

The ability to use steam boxes for cooking is important for manaakitanga (hosting and providing) for large gatherings. There are also environmental benefits and reduced economic costs that come with geothermally-heated steam boxes, pools, homes and marae.

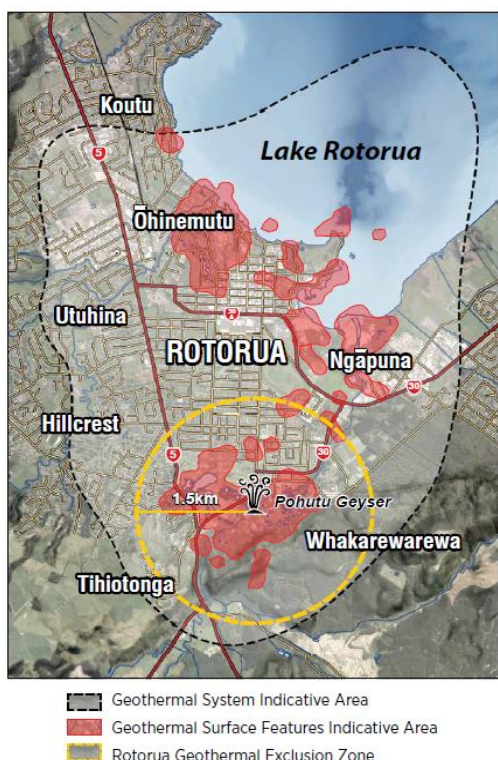
Geothermal activity has been a major drawcard for tourists since the late 1800’s, particularly with the international appeal and marketing of Rotorua as one of the spa capitals of the world. It is therefore a major source of employment and income for Rotorua city.

### 1.2 Te Ahi Kaa Roa Working Group

In 2019, Council established a working group – Te Ahi Kaa Roa – comprising hau kāinga representatives from Whakarewarewa, Ngāpuna and Ohinemutu villages. These are areas where tangata whenua live amongst some of Rotorua’s most significant geothermal natural features.

The group was formed to enable and ensure a tangata whenua lens or perspective, within a Resource Management context, regarding the Rotorua Geothermal System (Figure 1) and the review of the Rotorua Geothermal Regional Plan.

It is noted that establishing this group does not absolve Council of the obligation to consult with hapu, iwi and post-settlement governance entities in relation to the review of the Rotorua Geothermal Regional Plan.



**Figure 1: Rotorua Geothermal System (Bay of Plenty Regional Council, 2019b)**

Te Ahi Kaa Roa have been meeting regularly since January 2019. They were also involved in the development of an Issues and Options report for the Rotorua Geothermal System (Bay of Plenty Regional Council, 2019b).

### 1.3 Collation of hau kāinga perspectives on the health of geothermal tāonga

In 2020, a technical report was prepared on behalf of Te Ahi Kaa Roa, to collate the views, perspectives and observations of hau kāinga regarding the current health and wellbeing of geothermal tāonga within Rotorua.

It also:

- articulates the innate connection of the hau kāinga with geothermal tāonga.
- describes the observed changes over time in relation to geothermal use as well as the behaviour of key geothermal features.
- highlights the long-term implications of past and current geothermal allocation and use.

The report is a step towards addressing the following:

*“we don’t currently use mātauranga Māori to help us understand how the system was created, its characteristics and the changes that we observe. Nor do we use it to manage the system, and we have no cultural monitoring programmes. However, mātauranga associated with ngāwhā of Te Arawa has historical significance, is site specific and for Māori informs how we should behave.”*

Bay of Plenty Regional Council (2019b)

The report will help Council to understand hau kāinga values, use and priorities associated with geothermal tāonga.

## 2. DESCRIBING THE HEALTH OF GEOTHERMAL TĀONGA

What is notable is that, for the hau kāinga, it is impossible to describe the current state of our geothermal tāonga without:

- providing an overview about Te Ao Māori and mātauranga in relation to geothermal tāonga. This is because there is a strong linkage between geothermal health and the health and wellbeing of the people .
- outlining the impacts of the development of the city and the bore closure programme of the late ‘80s on the health and wellbeing of whānau living in a geothermal environment.
- identifying key tohu or indicators to articulate the health of geothermal tāonga.

Each of these are outlined briefly below for context.

## 2. Māori world view

The Māori worldview is holistic and interconnected. Māori see themselves as part of the environment and vice versa. The connection of Māori to the environment is both physical and metaphysical and transcends time. It is intergenerational and informs and guides mātauranga (Conroy and Donald Consultants Limited, 2020).

Although mātauranga Māori directly translates to “Māori knowledge”, it has much broader and deeper meaning, encompassing a “Māori way of knowing” that is based on hundreds of years of observations and experience (Bay of Plenty Regional Council, 2019a).

### 2.1.1 Geothermal Origins

Purākau (storytelling) is one of many methods of transferring oral histories and knowledge about the natural environment. One such purākau describes the journey of Ngātoroirangi, a tōhunga (priest) to the snowy peak of Tongariro.

Gripped by the elements he called to his sisters Kuiwai and Haungaroa, who were in Hawaiki (the ancestral home of Māori), to send fire to keep him alive.

<i>Kuiwai e!</i>	<i>Oh Kuiwai!</i>
<i>Haungaroa e!</i>	<i>Oh Haungaroa!</i>
<i>Ka riro au i te Tonga</i>	<i>I have been captured by the southern winds.</i>
<i>Tukuna mai te ahi!</i>	<i>Send me fire!</i>

His sisters sent Te Pupu and Te Hoata, the subterranean goddesses of fire who journeyed from Hawaiki under the seabed to Aotearoa.

They raised their heads at Whakaari/White Island to look for Ngātoroirangi, and at various locations en route to Tongariro, leaving geothermal activity in their wake.

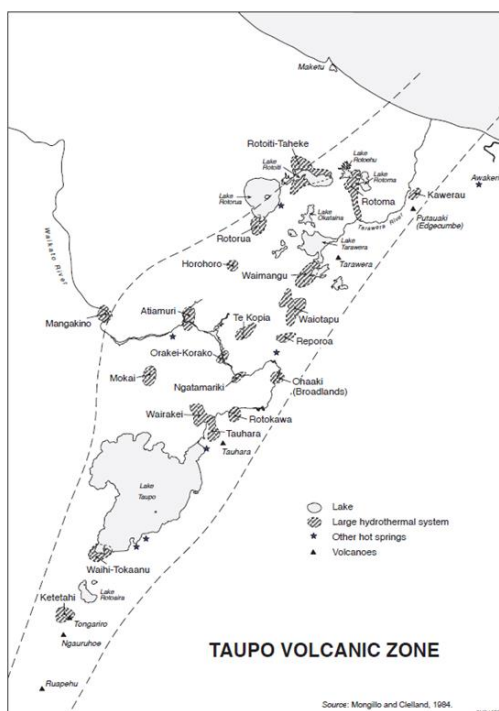


Figure 2: Taupo Volcanic Zone (Stokes, 2000)

### 2.1.2 Tracing the journey of Te Pupu and Te Hoata

Figure 2 shows the geothermal areas within the Taupō Volcanic Zone. It aligns with the locations visited by Te Pupu and Te Hoata and highlights what Māori have always known - that geothermal tāonga, from Whakaari to Tongariro, are connected.

### 2.2 Impact of city development and bore closure programme

Geothermal tāonga, and the relationship of the hau kāinga with those tāonga, have been affected by the development of Rotorua city. This includes, but is not limited to:

- reclamation or infilling of geothermal areas at Ōhinemutu and Ngāpuna.
- industrialisation of Ngāpuna causing the pollution and loss of geothermal springs and pools.
- excavation and/or diversion of ngāwhā and urban streams for land development and/or flood protection purposes.
- alienation of land – individualisation of Māori land title; and subsequent conversion of land for commercial and industrial development.
- unconstrained access to the Rotorua Geothermal Field, leading to over extraction and loss of geothermal features.

While the geothermal field is subject to natural changes (e.g. earthquakes), it was evident through observations, supported by scientific monitoring, that geothermal extraction was having a significant adverse impact on geysers and springs. For example, eruptions of the iconic Pohutu Geyser were less vigorous and frequent. Other geysers ceased to erupt completely, such as Te Horu (1972), Papakura (1972), Waikite (1967) and Wairoa (1940). In terms of ngāwhā, Korotiotio (which supplied the oil baths in Whakarewarewa village) stopped overflowing in the 1960s. Parekohuru, which also supplies the oil baths, stopped overflowing in 1987. Waikorua was closed in the mid 70s because the water levels had dropped so low that the ground became unstable.

The decline in geothermal health was significant such that government intervention was needed. Between 1986 and 1989, the bore closure programme involved:

- Revoking local city control over geothermal bores.
- Closing and grouting all geothermal bores taking fluid within 1.5km of Pohutu geyser.
- Closing all geothermal bores owned by a government department in Rotorua.
- Requiring all bores to be licenced and reinjection of geothermal fluids to moderate depths (>50m)
- Introducing a royalty system for geothermal energy use.

The bore closure programme was deemed successful in that it resulted in increased geothermal aquifer pressure and recovering of geyser and spring activity (Bay of Plenty Regional Council, 1999).

However, hau kāinga across Rotorua lost prized geothermal resources for bathing, home heating, healing and cooking. It also saw the loss of access to geothermal wells for home heating for entire central city suburbs. In contrast, the density of bores for commercial use (hotels/motels) did not decrease over the same time, “reflecting the ability of the commercial facilities to pay the resource rentals” (Bay of Plenty Regional Council, 1999).

### 2.3 Geothermal tohu (indicators)

Mātauranga is living, interactive knowledge gained from being immersed within and connected to an environment. Because hau kāinga live within their respective geothermal areas, they know and feel the natural rhythms of geothermal tāonga. They use tohu, or indicators, to notice changes over time. The tohu for geothermal tāonga are sensory-based and, depending on the area, may include:

- Visual / sight: presence (or absence) of geothermal features; height / strength of a puia; ngāwhā behaviour e.g. is it overflowing or not? is it bubbling more than usual?; presence (or absence) of specific vegetation e.g. manuka grows where the water is cooler; presence (or absence) of specific fauna.
- Feel / touch: water temperature e.g. is it cooler than usual?; water texture e.g. how the water feels to touch; strength of ground shaking i.e. associated with geysers.
- Aural / sound: Is the geyser or ngāwhā louder than usual?
- Smell: any changes in the smell?

Geothermal health can be articulated using the Māori terms for health and wellbeing, namely waiora and hauora. Both relate to geothermal tāonga (wai: water, which relates to water level, temperature and activity; hau: wind, which links with steam as well as aquifer pressure needed for geysers) as well as the health and wellbeing of people. The two are interconnected and cannot be looked at in isolation. This is because the health and wellbeing of tangata whenua is intrinsically linked with the mauri (lifeforce) of wai (water). Mauri is reciprocal – our mauri is filled up by the mauri of wai, and our ngāwhā and puia will also begin to heal when our connections and relationships are restored. When the giving and taking of mauri is not occurring, neither can heal. If the hau kāinga are increasing their relationship with their ngāwhā and puia, even in small ways, then they are giving back in some way to the mauri of these geothermal features. Both aspects are connected and cannot be looked at in isolation.

For this reason, people-centric indicators are also utilised: Home heating – can we warm our houses like we used to?

- Cooking and Preparation – can we cook like we used to?
- Bathing – can we bathe like we used to?
- Marae use – can we heat, cook and bathe at our marae like we used to?

## 3. REPORT OUTCOMES

Hau kāinga perspectives and observations were articulated by way of area-specific case studies: Whakarewarewa, Ōhinemutu and Ngāpuna. An additional case study for the Kuirau/Tārewa Road area is currently in development. While the geothermal uses at each area are similar, their geothermal landscapes, experiences and observations vary (Conroy and Donald Consultants Limited, 2020).

### 3.1 Health of Geothermal features – ngāwhā, puia

There has been mixed recovery of geothermal tāonga since the bore closure programme of the ‘80s. Pohutu continues to erupt, albeit not as vigorously as in the past. Papakura returned in 2013 but is subdued. A number of geysers never returned. Parekohuru continues to overflow to the oil baths, unlike Korotiotio which hasn’t overflowed since the 60s.

Geothermal features have also been lost or changed because of urban and industrial development over the last 75 years. For example, Waikite ngāwhā, which discharges into Te Ruapeka (Ruapeka Bay) at Ōhinemutu has become too hot for continued bathing or swimming by villagers. This has significantly impacted on the health and wellbeing of the geothermal feature and hau kāinga. Numerous geothermal springs have been diverted into manhole structures and piped under the road and into the Bay (M. Craigie, personal communication, May 21, 1997). Infilling and sedimentation at Te Ruapeka has changed its shape and subsequently cut the ngāwhā off from the lake. This prevents cooler water from the lake circulating with the geothermal inflows.



**Figure 3: Aerial view of Te Ruapeka in 1945 (left) and 2016 (right)**

Ngāwhā within Ngāpuna (which means the place of many springs) are now limited to one area, Te Pāpā-o-Ruāmoa, which is located on private land. It is noted that parts of Te Pāpā-o-Ruāmoa have become more active over the last 10 years.

### 3.2 Geothermal uses – cooking, bathing, heating

Whānau at all three villages have dedicated places for in-ground or ngāwhā cooking; and to prepare food (i.e. singe pigs) and cultural resources such as ingredients/materials (e.g. harakeke, paopao) for rongoā and weaving. There are also dedicated places for communal bathing for relaxation and healing. These uses have continued for generations. In relation to geothermal uses across each area:

### 3.2.1 Whakarewarewa

The use of geothermal baths for bathing, relaxation and healing continues within Whakarewarewa village, primarily at the Hīrere (or bottom / waterfall) and oil (or box) baths. The oil baths in particular, are used to treat ailments such as arthritis, lumbago and rheumatism. The baths are used daily by approximately 15-20 families who reside in the village. The numbers utilising the baths increase in the winter months and during winter sports to 100-200 people per week. It is noted that Te Roto-a-Tamaheke has been steaming more than usual during the April 2020 lockdown (when tourism and commercial use had largely ceased) which meant the water filling the Hīrere bath has been hotter than usual.

The villagers have had continuous and uninterrupted access to geothermal energy for cooking via steambox. Currently, there are at least six steam boxes in Whakarewarewa village itself, all with differing temperatures. The three steam boxes that are closest to Parekohuru ngāwhā are the hottest, with the ones further from Parekohuru known to be like warmer drawers, or our version of a natural microwave. These would typically be used for food already cooked and needing to be heated. There is a similar area at Te Puia, closely located around the Pohutu geyser, where a steam box is located. With no residents residing at Te Puia or in the valley, it is primarily used for cooking for tourists and visitors.

The bore closure programme resulted in the wharekai at Whakarewarewa village losing its geothermal bore and being forced to use gas and electricity to cook and heat water. Like other geothermal villages, this was due to the financial cost associated with meeting the new legislative requirements. There is still significant resentment for the loss of access to the geothermal resource for the wharekai, whānau and manuhiri (visitors), particularly with the neighbouring commercial hotel using the resource for pool and space heating for guests.

### 3.2.2 Ōhinemutu

Historically, the proliferation of warm baths and boiling springs at Ōhinemutu, along with the ability to use the warm ground to heat homes and grow crops (kumara, potato, maize, tobacco) highlighted the role of geothermal energy to enable self-sufficiency. Historical accounts from tauīwi (foreign visitors) noted how clean the air was at Ōhinemutu, due to the lack of smog from wood fires.

These days, only a limited number of whānau continue to have access to areas for cooking and bathing as there are fewer places to do so than in the past.

Steam boxes throughout the village are no longer operational, and the Tunohopu marae steam box also fluctuates because there is inconsistent heat and flow. Due to ongoing and exorbitant bore maintenance costs, the new wharekai at Te Kuirau marae no longer has a steam box.

Since it was rebuilt in 2018, all cooking has had to be done using gas. This affects mātauranga, with the loss of intergenerational knowledge and practices associated with steam box cooking.

Because geothermal was an accessible, affordable and sustainable source of heating, many homes were not insulated at Ōhinemutu.

The prohibitive costs of maintaining bores, hot water pipes and heating/bathing/cooking infrastructure now means a majority of whānau within the village have lost their ability to access geothermal home heating, cooking and bathing. This has had significant negative and long lasting implications on the health and the social and cultural wellbeing of whānau.

### 3.2.3 Ngāpuna

While this report is focused on the health of geothermal tāonga, it is essential to understand the historical context of Ngāpuna. This is because the industrialisation of the area has severely affected the relationships of Ngāti Hurunga Te Rangi with their lands, waters and geothermal taonga. For example:

- Alienation of land – whānau moved away from Ngāpuna due to the 1941 typhoid epidemic; forced individualisation of Māori land title by the Māori Land Court; industrial zoning of the village by Rotorua Lakes Council and subsequent conversion of land to industrial use by non-Māori landowners from the 1960s and onwards. This in turn meant a loss in connection between hapū members and their land, natural environment and cultural practices.
- Loss of geothermal features with the backfilling of areas to enable land development.
- Impacts of industrial land use on air and water quality as well as the health of hapū members, flora and fauna.
- Abstraction of water from the Puarenga Stream (Hemo Spring) to town supply purposes.
- Contamination of the Puarenga Stream from upstream land use and discharges (e.g. Red Stag (former Waipa) Mill site, RDC municipal landfill)
- Diversion and excavation of the Puarenga Stream for flood protection purposes.

These impacts are long lasting and intergenerational, and whānau are making do with what little is left of their geothermal taonga. As a result, Ngāpuna whānau can access some areas for cooking and bathing but these are limited in number.

Ngāpuna whānau have dedicated areas for cooking, both in-ground (tao tunu kai) or using ngāwhā. There are other ngāwhā that are used for food preparation (i.e. to singe pigs or make it easier to pluck chickens). Each area has a specific use, which may change over time, depending on the level of geothermal activity.

Due to water quality issues stemming from industrial land use in Ngāpuna, in-ground and steam box cooking is now limited to special occasions. Like Ōhinemutu, this results in loss of intergenerational knowledge and practices associated with these methods of cooking.



Figure 4: Aerial view of Ngāpuna in 1945

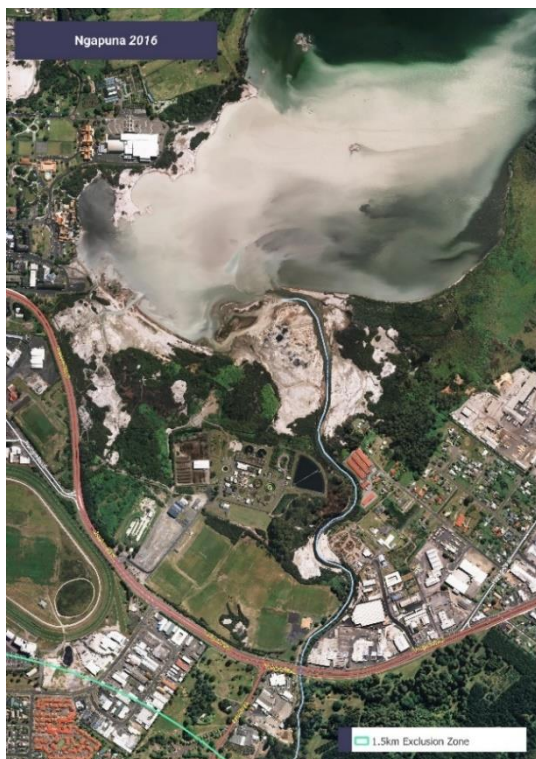


Figure 5: Aerial view of Ngāpuna in 2016

There are a couple of bathing pools in Ngāpuna. One example is the Ngāpuna or Top Bath (Figure 6), which is surrounded by light industrial land use, including a truck yard and truck wash facility, multiple sawmills and a waste transfer station. There are significant odour, air quality and water quality issues in this part of Ngāpuna. This, in turn, impacts the safety, enjoyment and use of the bathing pool.



Figure 6: Ngāpuna bath

None of the homes or marae within Ngāpuna are, or have ever been, geothermally heated. This is due to the inhibiting factors of cost and regulations for the hau kāinga.

### 3.2.4 Kuirau / Tārewa

While the bore closures of the 1980s have resulted in the recovery of geothermal features at Kuirau, the effects on whānau were significant. This is due to the loss of access to the geothermal resource for heating, cooking (via steambox) and bathing.

*“We can remember the day when ‘they’ came onto our land and poured concrete down our bore”* (Ngāti Kea Ngāti Tuara trustees, personal communication, May 31, 2018).

Although recovery of features at Kuirau has been good, as with other areas the development and urbanisation of land has meant that features have changed and are not as they once were. The geothermal spring adjacent to the marae is one such example. This was something that people could walk around safely until housing was allowed to be built there during the period of low geothermal activity. Once the features recovered following bore closures, houses had to be moved. Now the feature is fenced off and a bund put up around it, unable to be easily seen or accessed, even though this is Ngāti Kea Ngāti Tuara reserve land. This loss of connection and the matauranga around the resource has not been recognised and provided for.

*“The names of the Taniwha who live in these systems and the knowledge around individual sites and how these have changed over time is held only by us”* (Ngāti Kea Ngāti Tuara trustees, personal communication, May 31, 2018).

The hau kāinga continue to express considerable hurt about the loss of access to the geothermal resource. No compensation was given for the loss of access and the cost of re-installing a bore is too cost prohibitive for whānau.

There is also a lot of resentment with commercial interests taking the resource, using it, and making money from the resource, while local access is limited. An example is the local Aquatic Centre, which is geothermally heated, but where shared access that would enable Marae to heat, cook and bathe with the resource was not provided. For Tārewa Road in particular, geothermal could benefit many whanau, important that it is not just about individuals benefitting.

#### 4. A TREATY PARTNERSHIP APPROACH TO GEOTHERMAL MANAGEMENT

The process of collating cultural views, perspectives and observations has enabled the hau kāinga to articulate their views on the state of the geothermal resource in Rotorua, and therefore the impacts of past development and current management.

Understanding the health of the resource, and impacts on hau kāinga, can provide insight into desired outcomes and principles for future management and monitoring of the Rotorua Geothermal System. This includes:

- Protection of the rights of mana whenua to restore and maintain access to their geothermal resources. This means supporting hau kāinga to regain/retain the use of their geothermal resources for cultural activities including heating, bathing and cooking.
- Protection of the rights of mana whenua to manage and protect their traditionally held geothermal resources which includes the ability to ensure their sustainable use. This means mātauranga Māori being utilised equally alongside western science in any system management plan. It also includes mana whenua being resourced and supported to play an equal role alongside BOPRC in:
  - monitoring the use of our geothermal resources
  - managing the impacts of industry/tourism on our geothermal resources
  - managing the resource consent process involving our geothermal resources
- Implementation of a values-based approach to geothermal allocation to enhance social and cultural outcomes and make a tangible difference to people's lives. This means ensuring that allocation and future use of geothermal tāonga is for people and communities first, i.e. Prioritisation of Use for:
  1. Cultural Activities – marae, then
  2. Cultural Use – tangata whenua heating, cooking and bathing, then
  3. Rotorua ratepayers, then,
  4. Schools, then,
  5. Industrial/Commercial
- Recognition of Treaty of Waitangi obligations and the Māori worldview that water is part of one system, therefore whatever is discussed for freshwater also applies to geothermal waters and seawater.

This requires hau kāinga to continue to be more active and involved in all aspects of geothermal management, including planning, decision- making and monitoring.

The following principles are suggested by Te Ahi Kaa Roa collective to guide the way in which the Rotorua Geothermal System is managed, including future allocation. We need to ensure that geothermal planning and decision making:

- is intergenerational – for our children and mokopuna.
- reflects our place in the world - we are part of the taiao; our geothermal tāonga are a living entity (not just a resource) and our tuākana (older sibling).
- strives for balance and reciprocity - this means working within the natural limits of the environment and giving back (i.e. restore what is taken; take action to offset effects).

#### 5. CONCLUSION

This report highlights that the knowledge of those living within geothermal environments is invaluable to guide the long- term management and monitoring of the Rotorua Geothermal System. This knowledge is area specific and informed by hundreds of years of lived experiences and observations.

It is important to highlight that geothermal health is not limited to the physical characteristics and behaviour of puia and ngāwhā. It includes the ability for whānau and communities to continue accessing and using geothermal tāonga for their collective health and wellbeing. This is because the health and wellbeing of tangata whenua is intrinsically linked with the mauri of wai (water).

For this reason, describing the health of the Rotorua geothermal system, from a hau kāinga a perspective is wider than the 'physical health' of the resource as it includes the wellbeing of the people. It also acknowledges the cumulative and intergenerational effect of past events (e.g. city development, bore closure programme) on current use of geothermal tāonga.

The knowledge or mātauranga shared by the hau kāinga will help to enable a more holistic and culturally responsive approach to future planning, monitoring and management of the Rotorua Geothermal System.

#### ACKNOWLEDGEMENTS

Penny Doorman (Geothermal Programme Leader), Freya Camburn (Senior Policy Analyst), Rawiri Bhana (Māori Policy Advisor) and Gina Mohi (Pūtaiao Mātauranga) (of the Bay of Plenty Regional Council for their guidance, support in preparing this paper and in the development of the supporting document.

Peter Staite of Ngāti Hurunga Te Rangi for his contributions to the technical report for Ngāpuna.

Rukingi Haupapa for his contributions regarding Mātauranga for Ōhinemutu

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