VALUING USES OF THE WAIKATO AND BAY OF PLENTY GEOTHERMAL RESOURCE

Katherine Luketina, Femi Olubode, Yvonne Phillips

Waikato Regional Council
www.waikatoregion.govt.nz
Private Bag 3038, Waikato Mail Centre, Hamilton 3240, New Zealand

katherine.luketina@waikatoregion.govt.nz

Keywords: *Economic Analysis, Waikato, Bay of Plenty, Geothermal Tourism, Geothermal Direct Uses, Geothermal electricity Production, Institutional Grammar Tools, Ecosystem Services.*

ABSTRACT

In 2011, Waikato Regional Council investigated the contribution of geothermal resources to the regional economy, considering four uses: Tourism, Direct Uses, Electricity Production and Ecosystem Services (Barns and Luketina 2011). Tourism and Electricity production together provided $488 million. Bay of Plenty Regional Council followed suit in 2014, finding that the value of geothermal resources to the regional economy including from direct uses was $482.5 million, almost 5% of the region's GDP (Conroy and Donald 2014).

The councils are updating and expanding on these studies, and some aspects of valuing tourism are being researched jointly. Others have focused more specifically on the Waikato Region. Preliminary results for Waikato indicate a substantial increase in tourism visitor numbers, with a gain of 18% in the 2016-2017 year, and a projected increase of 24% for the 2017-2018 year.

In 2016, there were 905,000 visits by domestic tourists to geothermal sites in the Waikato Region, up from 450,000 in 2011. Geothermal attractions account for more than 16% of domestic tourism in the Waikato Region, up from 13% in 2012. In 2016 the Waikato Region had a total of 472,000 international visits to geothermal attractions (up from 290,000 in 2011).

The nine geothermal power stations in the Waikato region generate 6,230 GWh per year. Value added by geothermal electricity generation is $106 million and associated employee count is 106. Geothermal tourism contributes less to Gross Regional Product than geothermal electricity generation ($74 million versus $106 million) but employs 10 times more people.

With these increasing numbers, pressure on infrastructure and on fragile geothermal features and ecosystems is becoming a significant issue for tourism providers and the regulatory authorities tasked with sustainably managing the natural character of the geothermal resource.

1. INTRODUCTION

Under the Resource Management Act 1991 and the Local Government Act 2002, Regional Councils are responsible for sustainable management of natural and physical resources. The Taupo Volcanic Zone contains approximately 95 percent of New Zealand's geothermal resources, administered by Waikato and Bay of Plenty Regions (Figure 1).

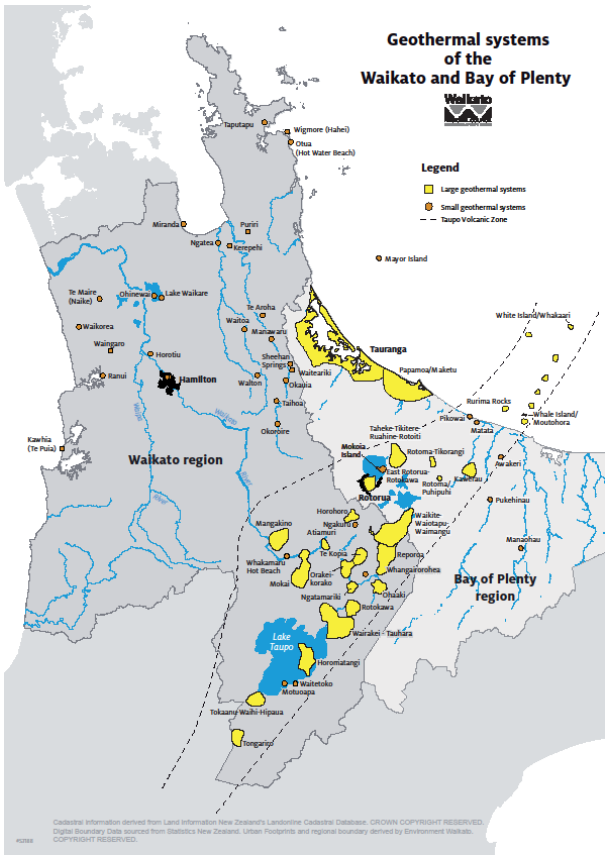

Figure 1: Map of the geothermal resources of the Waikato and Bay of Plenty Regions.

These geothermal resources are used for a variety of purposes, falling into four main categories: Tourism, Direct Uses, Electricity Production, and Ecosystem Services.

In the Waikato Region, there are approximately 50 geothermal tourism sites, including bathing facilities, nature tourism, and technology-related tourism. The Bay of Plenty Region also has many sites undertaking similar activities, in particular in Rotorua District where cultural geothermal tourism is a key feature, including well-known attractions of Waimangu, Whakarewarewa, Kuirau Park and Te Puia.

Direct uses in the Waikato Region include heating green houses to grow flowers, vegetables and native plants; timber drying; production of honey and associated products; and process heat for a board mill and a milk drying plant.

There are nine geothermal power stations in the Waikato Region, producing approximately 16 percent of New Zealand's electricity.

In the Bay of Plenty Region, Kawerau geothermal system supports significant electricity generation and direct heat use for industrial processes. Other direct uses include horticulture, space and water heating (domestic, municipal and commercial) and bathing.

This paper provides updated estimates of geothermal tourism numbers, spending and non-market values. It provides the high-level results of the survey for the Waikato and Bay of Plenty Regions, and the results of the travel costs analysis and an economic assessment for the Waikato Region. It compares these values with updated statistics for geothermal electricity generation.

2. TOURISM SURVEY

In 2011, Waikato Regional Council estimated the economic value of geothermal tourism (Barns and Luketina, 2011). The purpose of the current project is to update and refine those values. Data used in this analysis comprises on-site interviews at geothermal attractions in January 2017, a nationally representative poll of domestic visitors in November 2016, and the international and domestic visitor surveys run by the Ministry of Business, Innovation and Employment (MBIE). In the Waikato region, the total non-market value per year is estimated to be $43 million for domestic visitors and $14.2 million for international visitors. Non-market value is based on the cost of site access (travel cost plus admission) incurred by visitors. For multiple-purpose trips, the travel cost is apportioned amongst all purposes and activities.

Spending by visitors to geothermal attractions contributes to the regional economy, both directly and indirectly through industry linkages. After adjusting for multiple-purpose trips, total annual spending by visitors to Waikato geothermal attractions is $103 million for domestic visitors and $58 million for international visitors. The contribution to Gross Regional Product (GRP) is $80 million, or $146 million including multiplier effects. The direct contribution to employment is 1163 employees including all goods and services purchased by visitors, not just on-site employment. With multiplier effects, the employment contribution is 1689.

The value of geothermal tourism is also compared to the value of geothermal electricity generation. Electricity generated from geothermal energy in the Waikato region was 6,230 GWh in 2016. Associated wholesale electricity revenue was $379 million. Geothermal electricity generation contributes $106 million to GRP but only 106 employees. Geothermal tourism contributes less to GRP than geothermal electricity generation ($80 million versus $106 million) but employs more than 10 times more people.

2.1 Method

In January 2017, on-site interviews were conducted at eleven geothermal attractions in the Waikato region and four sites in the Bay of Plenty. The purpose was to estimate the recreation value of the attractions using the travel cost method. The interview sites comprise six commercial hot pool businesses, seven geothermal feature viewing sites and one natural, non-commercial hot water spring at Hot Water beach.

2.2 Responses

Two to three hours were spent at each site and a total of 212 interviews completed. Each response represents a group as only one person from each group was approached. 154 people (30 per cent) declined to be interviewed.

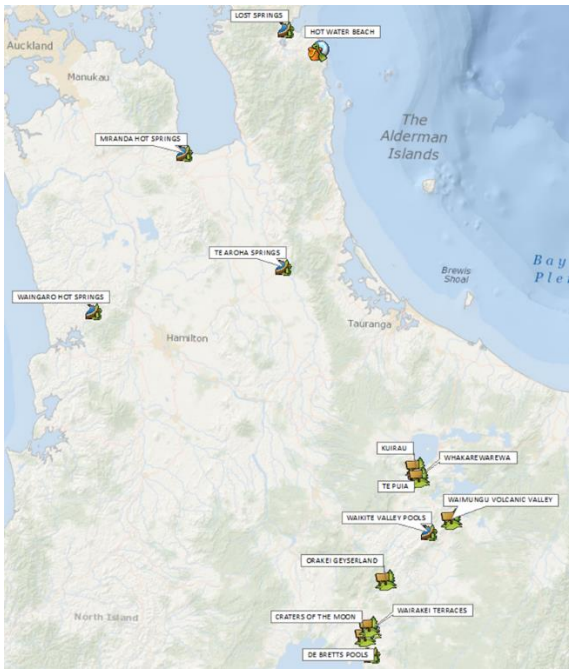

Figure 1 – Location of interview sites

Table 1 – Count of respondents

Site	Com-pleted	Re-fused	Refusal rate
Waikato			
Craters of the Moon	27	2	7%
De Bretts	24	15	38%
Hot Water Beach	43	32	43%
Lost Spring, Whitianga	11	7	39%
Miranda Hot Springs	14	10	42%
Orakei Korako Geyserland	31	1	3%
Te Aroha Mineral Baths	5	5	50%
Waikite Valley Hot Pools	23	1	4%
Waingaro Hot Springs	6	1	14%
Wairakei Terrace	7	4	36%
Wairakei Thermal Valley	14	0	0%
Bay of Plenty			
Kuirau Park	74	19	20%
Te Puia, Rotorua	46	42	48%
Whakarewarewa	26	9	26%
Waimangu Valley	15	6	29%
Total	**366**	**154**	**30%**

The majority of respondents were international tourists (86 per cent at Bay of Plenty sites and 60 per cent at Waikato sites). The most common region of residence for domestic visitors was Auckland (11 per cent) followed by Waikato (7 per cent). The most common country of residence for international visitors was the UK (21 per cent) followed by Germany (19 per cent) and Australia (18 per cent). Visitors from Asian countries accounted for only 6 per cent. This may have been under-counted because some tourism operators

requested that no interviews be held with people on organized tour groups.

Different sites had different visitor origins. Sites near Taupo had more visitors from Bay of Plenty and Wellington regions. Sites on or near the Coromandel peninsula (Miranda Hot Springs, Lost Spring and Hot Water Beach) had a higher proportion of Auckland visitors. The hot pool sites (De Bretts, Lost Springs, Miranda, Te Aroha and Waingaro) had predominantly domestic visitors. The site with the highest proportion of international visitors was Te Puia.

2.3 Group Composition

The average number of people per group (excluding tour groups) was 3. Miranda Hot Springs had the largest average group size (7.4) and Waimangu, the smallest (2.2). The most common type of group overall was a couple, with 63 per cent of people travelling with their spouse/ partner/ boyfriend/ girlfriend. A fifth of all groups included children, and 8 per cent included teenage family members. Twenty-two per cent included other relatives and 20 per cent travelled with friends or colleagues.

Table 2 – Residence location by destination region

	Count		Per cent	
Region of Residence	Bay of Plenty	Waikato	Bay of Plenty	Waikato
Outside NZ	138	124	86%	60%
Auckland	7	33	4%	16%
Waikato		26	0%	13%
Wellington	4	8	2%	4%
Bay of Plenty	6	6	4%	3%
South Island	4	1	2%	0%
Hawkes Bay		4	0%	2%
Taranaki	1	2	1%	1%
Manawatu-Wanganui	1	1	1%	0%
	161	205	100%	100%

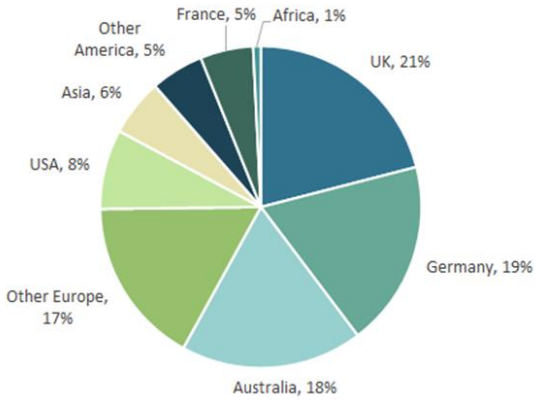

Figure 2 – International country of residence

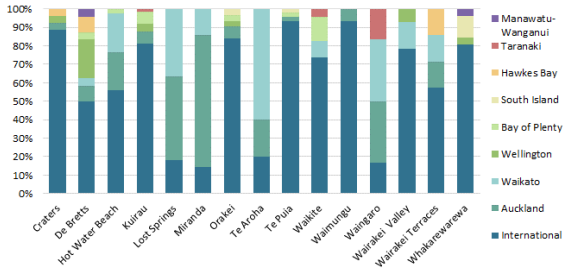

Figure 3 – Proportional visitor region of residence by site

Figure 4 shows a breakdown by site. The Lost Spring and Wairakei Terraces do not allow children so there were no children and few teenagers in groups visiting these sites. Lost Spring visitors were more likely to come with relatives or friends while Wairakei Terraces had predominantly couples. More than half of visitors to De Bretts, Miranda and Te Aroha pools brought children. Visitors to geothermal feature viewing sites were less likely to bring children or teenagers.

2.4 Purpose of Trip

The majority of respondents (63 per cent) said that visiting the geothermal attraction was the main purpose of their trip to the area. The second most common purpose was a general holiday or site-seeing (19 per cent). Outdoor recreation including beach activities and fishing was a popular purpose for visitors to Coromandel sites. Five per cent of people said their visit was only a stopover on the way to somewhere else. Three per cent were visiting friends or family. Two per cent said education or business was their reason for being in the area. Some visitors to Rotorua area said they wanted to experience Māori culture.

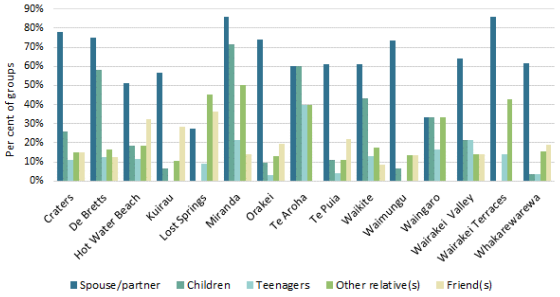

Figure 4 – Group composition by site

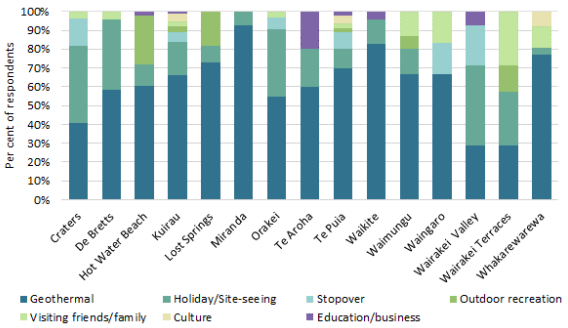

Figure 5 – Purpose of visit by site

2.5 Reason for Visiting This Site

Respondents were asked why they visited this particular site. The free-response answers are a mixture of motivational drivers (i.e. "I wanted to swim") and awareness (i.e. "I saw a brochure"). There is a marked difference in reasons for visiting bathing sites versus viewing sites so these are graphed separately in Figure 6 and Figure 7. The most common reasons for visiting bathing sites were being nearby (18 per cent), repeat visit (18 per cent) and fun for children (13 per cent). A nice/natural appearance was mentioned as a reason for visiting Hot Water Beach and the Lost Spring sites. A specific interest in geothermal features was the most common reason for visiting the viewing sites (22 per cent). Brochures and travel guides were the next most common reason (15 per cent), followed by being nearby (12 per cent) and the

unique/different landscape (12 per cent). This highlights the importance of landscape aesthetic appeal in tourism.

3. TRAVEL

3.1 Travel distance and mode

The average geothermal attraction visitor travelled two hours and fifteen minutes from their previous destination. Only 18 per cent of visitors travelled directly from home to the area of the site. Most people were on a multiple-destination trip, particularly international visitors. Visitors to Whakarewarewa travelled the furthest with an average time of 190 minutes, however, as explained in the next section these people tended to visit multiple attractions.. Te Aroha hot springs had the lowest average with visitors coming primarily from Hamilton, Cambridge and Morrinsville. Half of all visitors travelled from their previous location in a rental vehicle, 42 per cent in a private vehicle and small numbers by taxi, bus, walking, cycling or aircraft. Figure 8 shows the variation in average travel time for different sites.

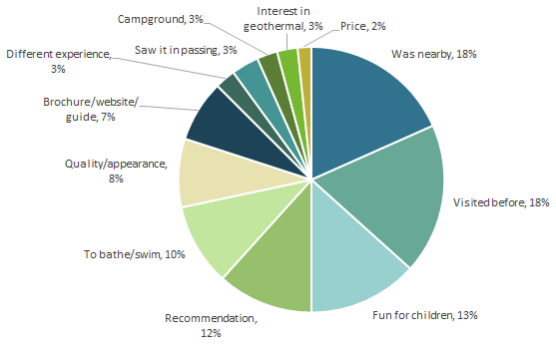

Figure 6 – Reasons for visiting geothermal bathing sites

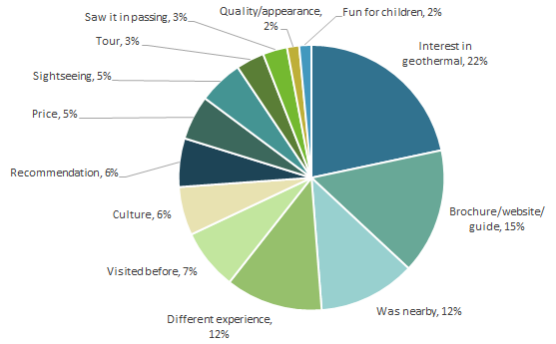

Figure 7 – Reasons for visiting geothermal viewing sites

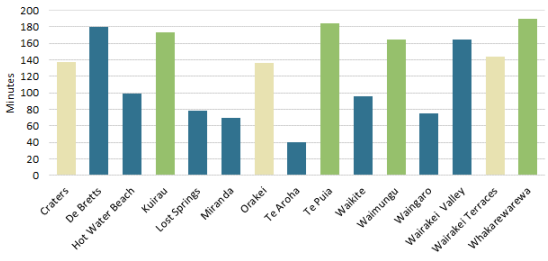

Figure 8 – Travel time from previous location

3.2 Travel Cost Method

Marginal travel cost comprises a $0.20 per-kilometre petrol cost and an opportunity cost of time based on a fraction of the individual's hourly wage. What fraction to use for the opportunity cost of time is a matter of some debate in the literature, and the true value has been shown to vary by context and individual circumstances (Larson & Lew, 2013). A commonly used fraction is one-third (Englin & Shonkwiler, 1995) so that is used for this study. The cost of rental vehicle hire is not included because it is a fixed cost and might not have been hired specifically to visit the attraction. If the visitor travelled by taxi or shuttle the rate is $3 per kilometre. Only two people flew from their previous destination, probably because regional flights are relatively expensive. These costs were input manually based on standard Air New Zealand fares.

Many visitors were on multiple-purpose trips so the entire travel cost is not allocated to the geothermal attraction unless the respondent stated it was the main purpose of the trip. For trips where the main purpose is general holiday, sight-seeing or outdoor recreation the travel cost is divided by the number of activities stated. For trips where the main purpose is visiting friends or family, education, business or a stop-over, only travel from the nearest urban area is allocated. This worked out to an average 10 per cent of the total travel cost.

3.3 Travel Cost Results

The average access cost (travel plus admission) of Waikato geothermal attractions was $54 per adult after adjusting for multiple-purpose trips. Figure 9 shows the average access cost for each site, as well as the proportion attributed to the site. When the site was not the main purpose of the trip the travel cost is only partially attributed to the site. Te Puia visitors had the highest average access cost ($181) but many visitors were on multiple-destination or multiple-purpose trips so only $94 is attributed to the site. Trips to Miranda Hot Springs were most likely to be single-destination trips because of the remoteness of the site and the relative lack of other nearby attractions. Hot Water Beach has the lowest access cost due to free admission and visitors tend to be on multiple-purpose trips so only a small proportion was attributed.

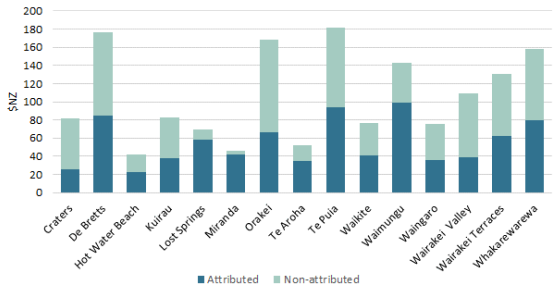

Figure 9 – Average travel cost and proportion attributed to site

3.4 Trip expenditure

Visitors were asked to estimate their total spending in the area for this trip and the average amounts are presented in Figure 10. Visitors to Craters of the Moon spent the most in total, mostly due to people staying more than 3 days in the Taupo area and spending significant amounts on accommodation. Visitors to Miranda and Te Aroha springs did not stay

overnight and spent the least. Visitors to the Lost Spring spent the most ($156) on admissions (this includes admissions to all attractions visited in the area).

Figure 11 shows average expenditure by origin of visitor – whether they live in the region, elsewhere in New Zealand or overseas. Interregional domestic visitors have the highest average spend. The difference is partly because interregional visitors stay in the area longer on average, 2.2 nights versus 2 nights for international and 0.7 nights for in-region visitors. Interregional visitors apparently spend more on petrol in the area, even though international visitors drive further from their previous location. This may be because international visitors start their journey with a rental car already full of petrol. Few visitors pay for transfers or drop-offs with an average of only $4 per respondent.

4. AGGREGATION OF DOMESTIC VISITOR VALUES

4.1 Method

In October 2016, a question about geothermal attraction visits was included in a monthly poll run by market research firm UMR. This was a population-representative panel of 750 people across the country and can be used to aggregate values for the whole population when combined with per-trip values from the on-site interviews. Total domestic visitors are estimated by multiplying the average number of trips per person for each region by the population aged over 16 (Statistics NZ estimates) for that region.

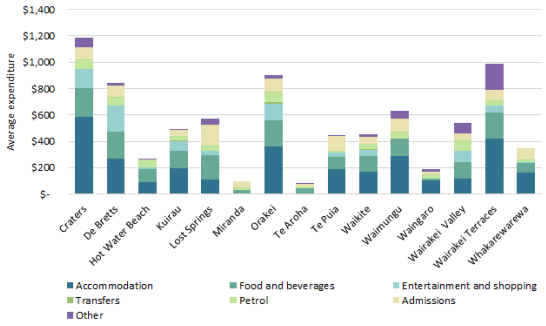

Figure 10 – Expenditure in area by site and category

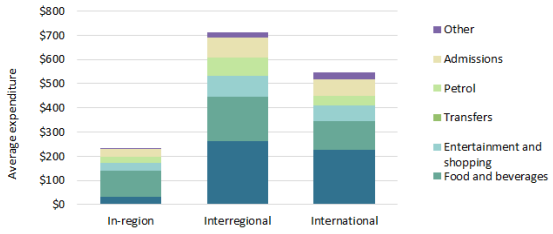

Figure 11 – Expenditure in area by visitor type

The implied non-market value of geothermal attractions varies by origin region due to different travel costs and different sites visited. To calculate the value of Waikato geothermal attractions to domestic visitors, the total number of visitors was multiplied by admission price plus average (allocated) travel cost for visitors from each region. For multiple-purpose trips, only a fraction of the travel cost is allocated to geothermal attractions.

In-region trip spending is similarly apportioned between geothermal attractions and other trip purposes, and the average allocated spend is then multiplied by total domestic visitors.

4.2 Results

Overall, 16 per cent of the UMR panel said they had visited a geothermal attraction in the Waikato Region in the past year. The proportion was highest in the Waikato Region (34 per cent) and lowest in the South Island (2 per cent). Figure 12 shows the proportion of people who visited once, twice, or more often. The right axis shows the total estimated number of trips based on the population of over-16-year-olds. The total number of trips per year is estimated to be 905,000. Aucklanders made 360,000 trips, Waikato residents 256,000 and Bay of Plenty residents 102,000.

According to the Domestic Travel Survey (MBIE, 2012) which ceased in 2012, there were just under 7 million trips to the Waikato region in 2012. These results imply that 13% of domestic visitors visited a geothermal attraction.

The average access cost for domestic visitors is $47.40 per adult.

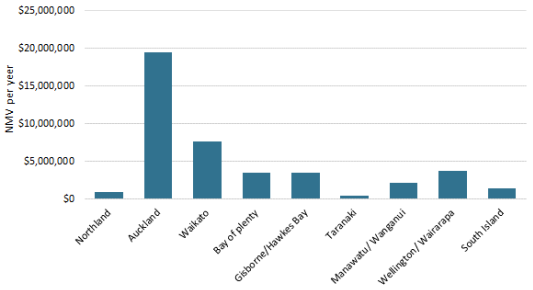

Figure **13** shows that total value is highest for the Auckland Region (due to the large number of visitors from Auckland) followed by the Waikato Region. The implied non-market value is $42.9 million per year. This is a conservative estimate since people may value a site more highly than the amount it cost them to access it.

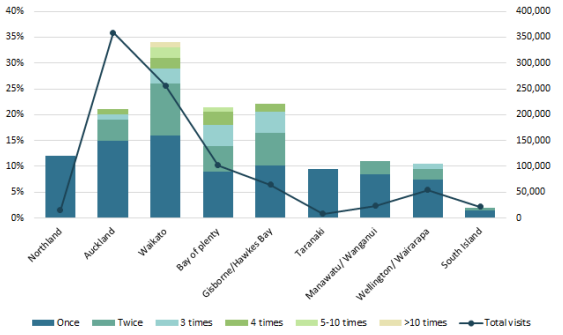

Figure 12 – Waikato geothermal attraction domestic visits by region of residence

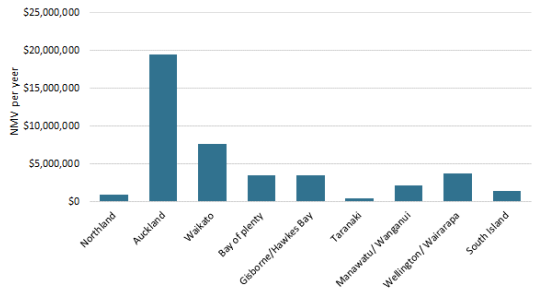

Figure 13 – Domestic non-market value of Waikato geothermal attractions

The average local spend per adult per trip was $246. (Spending per trip from this survey was compared with MBIE 2012). After filtering for trips to the Waikato region, which included hot pool or geothermal activities, the average spend per adult per trip was very similar at $243. After adjusting for multiple-purpose trips this reduces to $114 allocated to geothermal attractions. Waikato residents spent the least on average ($37) while Auckland residents spent $146 and Wellington residents $300. Total spending allocated to geothermal attractions is **$103 million** per year. Figure 14 shows a breakdown by region of origin. The largest share is from Auckland residents ($52.3 million).

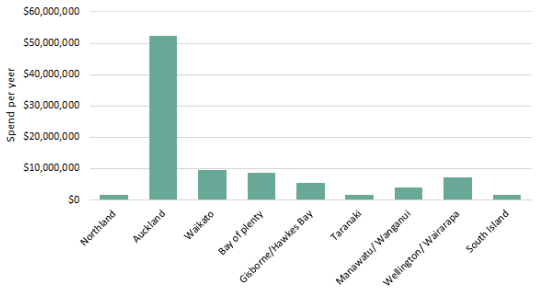

Figure 14 – Annual in-region spend allocated to Waikato geothermal visits by origin

5. AGGREGATION OF INTERNATIONAL RECREATION VALUES

5.1 Method

The total number of international visitors to Waikato and Coromandel tourism areas are sourced from the 2016 International Visitor Survey (Stats NZ, 2016). IVS tables provide the number of people who visit each area and the total number of tourists who do geothermal activities. There are four tourism areas with geothermal attractions (Waikato, Coromandel, Rotorua and North Canterbury) so total geothermal visitors are apportioned to these areas in the same ratio that the areas receive international visitors. Total international geothermal visitors are then multiplied by average spend by international visitors in the on-site surveys to get total spend.

The implied minimum value to international tourists is admission price plus the portion of travel cost allocated to geothermal attractions. The average value from this survey is multiplied by estimated total international visitors.

5.2 Results

In 2016 there were 1,025,560 international visitors who visited geothermal attractions in New Zealand. These are allocated between the areas with geothermal attractions as per Table 3. This results in a total of 472,000 international visitors to geothermal attractions in the Waikato region.

Table 3 – Share of international visitors to areas with geothermal attractions in 2016

	Waikato RTO	Coromandel RTO	Rotorua RTO	North Canterbury
International visitors	**445,984**	**242,562**	**806,069**	**190,459**
Share of visitors	**30%**	**16%**	**54%**	**13%**
Geothermal tourists	**306,021**	**166,439**	**553,100**	**130,687**

The average admission cost and travel allocated to geothermal attractions is $37.50 per international visitor. The total implied value (minimum) to international visitors is therefore **$17.7 million** per year.

Average expenditure allocated to geothermal attraction visits is $124 per adult. Total expenditure is **$58.5 million** per year.

6. ECONOMIC IMPACT ASSESSMENT

6.1 Method

The economic impact assessment measures impacts on Gross Regional Product (GRP), which is a measure of total economic activity in the Waikato Region. It provides useful contextual information but does not count effects on wellbeing that are not bought or sold in a market.

Direct expenditure by visitors is a measure of economic "output" consumed by visitors. Value-added is equivalent to output minus costs. Gross Regional Product (GRP) is the total of all value-added within the region, with some adjustments.

Visitor expenditure allocated to geothermal attractions is categorised into industry sectors used in the multi-region input-output tables and economic summary provided by Market Economics (2007). These include "arts and recreation services", "accommodation and food services" and other "retail trade". Impact ratios for converting output to value-added and employment are sourced from this economic summary. Industry sectors are connected so spending in one area has flow-on effects to the rest of the economy. "Indirect" effects are output of other sectors required to meet the demands of the sector of interest. "Induced" effects are caused by employees of the affected sectors spending their income on other goods and services. These effects are quantified using sector-specified multipliers also provided by Market Economics (2007).

Table 4 – Economic contribution of visitor spending

Industry sector	Recreation Services	Accom. & food services	Retail Trade	Total
Direct Expenditure (output)	73,788,879	54,547,361	33,512,057	161,848,298
Output + indirect effects	111,892,174	81,312,550	49,139,680	242,344,404
Output + indirect & induced	165,561,349	128,589,187	80,704,939	374,855,474

Direct Value-added (GRP)	35,193,033	25,610,597	19,063,592	79,867,222
GDP + indirect effects	52,301,089	37,002,407	26,011,403	115,314,899
GDP + indirect & induced	64,901,611	48,102,080	33,422,338	146,426,028
Direct Employment (FTEs)	339	548	275	1163
Employment + indirect	513	622	326	1461
Employment + indirect & induced	619	690	380	1689

6.2 Results

For the Waikato Region, total spending allocated to geothermal visits is $103 million (domestic) plus $59 million (international) which totals $162 million per year. With indirect and induced effects the geothermal tourism sector is associated with $375,000 worth of output. Value-added is $80 million or $146 million with indirect and induced multiplier effects. Direct employment related to geothermal tourism is 1165 FTEs. This includes employment in all areas where geothermal tourists spend money, not just at geothermal sites. With indirect and induced effects the total is 1689 FTEs.

Total value-added or Gross Regional Product (GRP) in the Waikato region was $21.7 billion in 2016 in current prices. Value added by tourism was $818 million in current prices. Value-added by geothermal tourism is 9.8% of total tourism and 0.4% of GRP. (Multiplier effects are not included when comparing with total GRP because every other sector also has multiplier effects and it would exaggerate the importance if these effects were only included for the sector of interest.)

7. COMPARISON WITH ELECTRICITY GENERATION

In 2017 there were 9 geothermal stations in the Waikato region. Average annual generation totalled 6,230 GWh per year. Volume-weighted average wholesale price in the area was around $60 per MWh in the year ended June 30th, 2016 (Mercury 2017). Waikato geothermal generation is therefore worth around $379 million. Value-added by geothermal electricity generation is $106 million and associated employee count is 106. Geothermal tourism contributes less to GRP than geothermal electricity generation ($80 million versus $106 million) but employs 10 times more people.

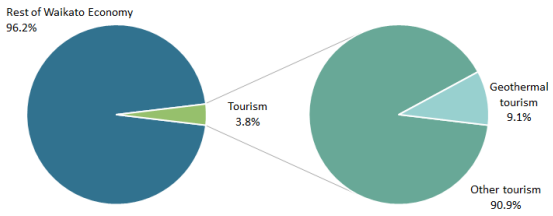

Figure 15 – Contribution to Waikato GDP of geothermal tourism

8. FURTHER RESEARCH IN PROGRESS

A work in progress component of this research project is a site-specific assessment of direct uses and geothermal ecosystem services and values. It is acknowledged that not all ecosystem services can be appropriately measured in monetary terms, using internationally recognised assessment frameworks (Haines-Young, R. and Potschin, M., 2012). The information from this study and other sources are being used to characterise and assess the ecosystem services that individual geothermal attraction sites in the Waikato Region provide. In addition, the study is exploring the Matauranga Maori values of geothermal features and their dependent ecosystems.

An analysis of the costs to businesses that use geothermal resources of complying with Waikato Regional Council's Objectives, Policies and Rules is underway using the Institutional Grammar Tools framework.

The environmental costs of the different sources of electricity generation were assessed in 2012 (Denne, 2012). Geothermal was found to have the lowest environmental cost of all electricity sources. We intend to include the environmental costs of geothermal electricity production in the overall assessment of the value of geothermal electricity production.

Although tourism spending is good for the local economy, growth may cause problems such as congestion, habitat damage or reduced visitor enjoyment. Future research may be required to investigate the costs and challenges associated with visitor growth.

9. CONCLUSION

Geothermal systems in the Waikato and Bay of Plenty Regions provide a wide range of ecosystem services including recreation value. They also provide energy for electricity generation and industries. In this report, we find that the numbers of visitors to geothermal attractions have increased significantly in recent years.

ACKNOWLEDGEMENTS

Research carried out in the Bay of Plenty Region was funded by the Bay of Plenty Regional Council. Sandra Barns contributed to survey design, implementation and analysis. Freya Camburn and Penny Doorman provided input and liaison.

This report would not have been possible without the generous provision of data from many different sources. The authors thank the interviewees who gave up their leisure time to answer our questions, and the proprietors and staff of commercial establishments who willingly provided information on staff and visitor numbers, and enabled the interviews to take place.

REFERENCES

Barns, S. & Luketina, K. M. *Valuing Uses Of The Waikato Regional Geothermal Resource* In Waikato Regional Council (Ed.) Technical Report 2011/15. Hamilton, Waikato Regional Council (2011). http://www.waikatoregion.govt.nz/tr201115

Denne, T.: *Environmental Costs of Electricity Generation*. Waikato Regional Council Technical Report 2012/18 Series Hamilton, Waikato Regional Council. (2012). http://www.waikatoregion.govt.nz/tr201218

Conroy And Donald Consultants Ltd: *Valuing uses of the Bay of Plenty Regional Geothermal Resource.* Bay of Plenty Regional Council, Tauranga. (2014)

Haines-Young, R. and Potschin, M., 2012. *Common international classification of ecosystem services (CICES, Version 4.1)*. European Environment Agency, 33.

English, J., & Shonkwiler, J. S. (1995). *Modeling recreation demand in the presence of unobservable travel costs: toward a travel price model.* Journal of environmental economics and management, 29(3), 368-377. Infometrics: *Waikato Region economic profile 2016* https://ecoprofile.infometrics.co.nz/waikato%20region

Larson, D. M., & Lew, D. K. (2013). *The opportunity cost of travel time as a noisy wage fraction*. American Journal of Agricultural Economics, 96(2), 420-437.Market Economics: *Economic Summary Waikato Multi-Regional Input-Output Model,* unpublished report for Waikato Regional Council) (2007).

MBIE: *Domestic Travel Survey, (2012)*http://www.mbie.govt.nz/info-services/sectors-industries/tourism/tourism-research-data/domestic-travel-survey Accessed 30 June 2017

Mercury Ltd: *Quarterly Operating Information for the three months ending 30 June 2017 compared with the same period last year* https://www.mercury.co.nz/Investors/Results-Reports/Operating-information.aspx

Millennium Ecosystem Assessment (2005). *Ecosystems and human well-being*. Washington, DC: Island Press. ISBN 1-59726-040-1.

Stats NZ: *International Visitor Survey tables, 2016. http://www.stats.govt.nz/browse_for_stats/industry_sectors/Tourism.aspx* Accessed 30 June 2017