USING THE MAURI MODEL TO COMPARE THE EFFECTS OF FORESTRY AND GEOTHERMAL ON CENTRAL NORTH ISLAND (CNI) IWI WITHIN THE CNI FOREST COLLECTIVE OF 2008

Author Details

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Abstract

The aim of this paper is to assess the environmental, economical, cultural, and social impact of timber forestry and geothermal development on the Central North Island (CNI) Māori (see Figure 1). From an assortment of scholarly journals, reports, and news articles, I gathered information to provide indicators for a Mauri model. My timeframe consists of a base time, which is pre-industrial or "pristine," current, with the inclusion of the 2008 GNI forest collective, and in 2042 because forests need about 30 years to grow. For each category the state of the Mauri diminished from the base to the current and improved, but not necessarily enhanced, from the current to 2042. Overall, geothermal and forestry industry impacts on the state of the Mauri are quite similar. The paper may help prevent the local Māori from losing sight of their traditional values as they continue to utilize these resources in the future. At the same time, this research measures the positives and negatives of forestry as well as geothermal, possibly providing a tool to use for future decision in the CNI forest Collective.

Introduction

The Māori, like many other indigenous groups have a special relationship with the land and the environment they consider themselves part of. Using the sun, stars, bird flight paths and other natural navigation cues, the Māori arrived to New Zealand on vakas sometime in the 14th Century (Ian 2012). Their survival depended on their knowledge of the environment and once on land, they had to have incredible observational skills to adapt to a foreign area. These abilities enable them to thrive and this deep connection with the land has carried over to many of

the 700,000 Kiwis of Māori decent and approximately 78 Iwis throughout New Zealand (2006 Census Iwi Profiles).

After depending on their knowledge of the land to safely arrive and thrive in New Zealand, the Māori have continued to exemplify a deep connection with the environment. Even today, many Māori consider themselves part of the land and this close relationship serves as integral part of their lifestyles. In their culture a Tikangi Māori (set of protocols) exists to guide one's actions with the land to protect it and ensure that it remains pristine over generations. Changes to the land can result in a diminished amount of mana (prestige), as knowledge of the land and being able to provide for guests is essential. The land represents the breadbasket and Māori rely on Papatūānuku (earth mother) to provide for them (Frontiers Abroad 2012).

The forests and geothermal are essential parts of this relationship. Tane Mahuta, the custodian of the forest domain was the first-born child of Papatuanuku (earth) and Ranginui (sky), and therefore part of Māori lineage back to the universe (Miller 2007). Geothermal is similarly connected. Although stories vary, Ngatoro-i-rangi, the prominent priest who settled New Zealand, was climbing Mount Tongariro when he got frigidly cold and summoned help from his sisters Te Hoata and Te Pupu. On the way, they developed the geothermal resources from White Island to Tongariro (Māori and Geothermal Resources). Without a doubt, there is a balance between utilizing the land efficiently and over exploiting it.

The importance of money and the ever-encroaching demands of resources in today's society have complicated this relationship. For example, in 2009 Hapu (subgroups) from the Kaeo area occupied Crown land near Omahuta Forest due to ongoing destruction of burial sties and continued land degradation on land they thought was theirs (Edmondson 2009). Another example is how the Wairākei power station has polluted the Waikato River by dumping

geothermal waste into it (Stewart 2009). This contamination has negatively affected the "tupuna awa," or power and prestige of the river in the eyes of the local Māori (Lanning 2007). Controversy over forest and geothermal ownership and practices makes the 2008 CNI Forest Collective extremely relevant as it deals with the transfer of land from the Queen to a group of eight Iwi (tribes/groups). Furthermore, the timber and geothermal practices involved on the land, whether carried out by Māori and/or others impact the social, economic, environmental and cultural value of that area and the 110,000 members of those eight Māori groups (Finlayson 2009). While technical reports with scientific data are generally required for land use, decision-making bodies have often overlooked the impacts these land transformations have on the local Māori population. This belief is echoed by the Ministry of Agriculture and Forestry: "Any discussion about the harvest of indigenous timber in NZ tends to invoke rather heated debate, much of which is based upon ideology, rather than science and fact." This statement shows the current disregard for "ideology" like spiritual connection in the decision-making framework. Secondly, much of the debate, as supported by this statement focus on indigenous forests, but few reports have been done concerning plantation forests.

By utilizing secondary sources, scholarly journals, news articles, and other sources, the goal of this study is to, through the lens of the Mauri model, identify the positive and negative aspects of forestry and geothermal to the 110,000 Iwi members who are part of the CNI Forest Collective. My report seeks to help fill in holes within forestry and geothermal research by balancing the outcomes of the CNI Forest Collective between technical/scientific reports and indigenous values/knowledge. By doing so, it provides a comparison of the pros and cons between geothermal and forestry production. Many Māori involved in the settlement are still

questioning how the land transfer and timber/geothermal use affects them and this paper may help explain the outcomes in addition to providing the framework for future decisions.

Background

In 1989, the Crown and New Zealand Māori entered the Crown Forests Agreement, in which they passed the Crown Forest Assets Act and established the Crown Forestry Rental Trust. This trust enabled the Crown to sell forest assets while keeping their land ownership. However in 2007, the Crown broke the principles of the Treaty of Waitangi by giving CNI Forest Land to the Te Pumautanga Iwi, failing to act in the best interest of all CNI Iwi. In response the Waitangi Tribunal decided that the CNI collective of Iwi should negotiate with the Crown to best allocate historical CNI land claims (New Zealand 2008). In 2008, with the CNI Forests Land Collective Settlement Bill, the Crown transferred about 176,000 ha of woods to the CNI collective, portioned in pieces based on historical claims. These woods are spread out throughout the Kaingaroa, Waimihia, Crater, Horohoro, Pureora South, Taurewa, Tokorangi Waituhi and Whakarewarewa forests within the CNI (Finlayson 2009).

Traditionally, the Māori used geothermal springs for things like food, bathing, swimming, and healing and this strong connection has been part of their culture for generations. While geothermal has been a tourist attraction for some time, it wasn't until 1958 that the first geothermal plant in New Zealand was built in Wairākei and now there are currently eight geothermal plants in the Taupo Volcanic Zone (TVZ), seen in Figure 2 (Frontiers Abroad). Geothermal production uses steam produced from reservoirs of hot water usually found a mile or more below the Earth's crust. Production wells are drilled into the ground to facilitate the pressurized movement of the hot water towards the surface (Figure 3). Re-injection wells pump

cold water back into the ground, which is then heated by the Earth's magma and continues the cycle. Individual geothermal fields in New Zealand are 14km/sq on average (NZ geothermal). As apparent in Figure 2, there are many major geothermal fields in the Lake Taupo region alone, which is part of the CNI area. These provide the Collective opportunities to invest in geothermal plants, which already provide 13% of New Zealand's energy use (Geothermal Energy 2009). What's more is that many of the possible developments in the area require Iwi owners to permit land access, giving the Collective great leverage. As outlined by the Kiwi Strategy Overview, the collective wants to utilize the 0.5 GW known capacity and 1.0 GW identified capacity "to transform the Collective into a supplier of 10-20% of New Zealand's electricity within a 5-10 year time horizon"(E Kiwi 2009).

Forestry, like geothermal has been an invaluable resource for the Māori. Historical uses include fishing, hunting, gathering, shelter, clothes, carving and medicine. Originally, 86% of New Zealand was covered in indigenous forests. Before the Europeans arrived there was a 15% reduction in indigenous forest cover from a combination of fire and anthropogenic inputs like land clearing for agriculture, especially bracken fern growth which was a large part of the Māori diet (McGlone). However, the land use remained sustainable until the Europeans arrived and needed timber for housing production and more land for agriculture. By the 1870's there was only 23% forest cover remained (Figure 4). Logging also became economically viable during this time, but plantation forestry first started in the 1930's to give people work during the depression. There are currently 560,000 ha of plantation forests in the CNI, predominantly radiant pine and Figure 5 explains the typical forestry cycle (NZ Plantation Forestry Industry).

The collective is now the largest landowner in the New Zealand forestry industry and will likely obtain more control in the future (Economic Development 2008). In 2009, the collective

chose to terminate Kaingaroa Timberland's ownership of the Kaingaroa trees, meaning over the span of 35 years as the trees are harvested the collective will begin owning the blocks for replanting. In this case, their strategy is to "create a forestry company to manage and replant the returning land blocks, until we ultimately own both the land and the forest, invest in existing wood product distribution businesses (e.g. in North America and Europe), and use the knowledge gained from these investments to grow customer demand for certain wood products"(E Kiwi 2009). The Kaingaroa forest makes up 42% of total New Zealand timber harvest and as a whole forestry constitutes 3% of the country's GDP (NZ Plantation Forestry Industry). To meet the projected increased timber requirements, the Collective wants to expand processing and logistical capability.

Historically, there have been problems as well as opportunities provided by geothermal and forestry on Māori populations. Although the CNI Forest Collective shifts more control into the hands of the local Iwi balance between exploitation and preservation are essential to avoiding mistakes of the past. A comparative analysis between geothermal and forestry through the use of the Mauri model should provide advantageous information for the Collective to ensure geothermal and forestry uses are sustainable for generations to come.

Methods

There are 63 Iwis located on the North Island, but I will focus on the eight groups that are involved with the CNI Forest Collectives. These Iwi include Ngai Tuhoe, Ngati Manawa, Ngati Rangitihi, Ngati Rangitihi, Ngati tuwharetoa, Ngati whakaue, Ngati whare, Raukawa, and te Pumautanga O te Arawa, making up more than 110,000 members (Finlayson 2009).

"The Mauri Model is a decision-making framework that provides a culturally based template within which indigenous values are explicitly empowered alongside Western knowledge" (Hikuroa, Slade, and Gravely 2011). The model measures social, cultural, environmental and economic well being by using a number system ranging from positive 2, which is fully restored to a -2, representing a denigrated Mauri (life-force) (Figure 6). I have gathered information from a multitude of secondhand accounts as well as scholarly papers, news articles, and other sources to help formulate a Mauri Model for geothermal and forestry in the CNI Forest Collective. The paper has drawn heavily from the indicators and organization from the paper "Implementing Māori Indigenous Knowledge (mātauranga) in a Scientific Paradigm: Restoring the Mauri to Te Kete Poutama" (Hikuroa et. al. 2011). I have used the Menominee Venn Diagram from Native Americans in Wisconsin who are practicing sustainable development of their indigenous forest. This tool has helped me organize my indicators and draw conclusions as it shows the overlap of social, cultural, economic, and environmental factors to ultimately produce sustainable development (Figure 7). I have also implemented the use of an economic table from the paper *Tomorrow's Landscape,* which helps show the time frame and money involved with geothermal and forestry development (Figure 8). After establishing the impacts of forestry and geothermal on the eight Iwis in the CNI area, the Mauri model will provide the main comparison tool between geothermal and forestry impacts on Māori land and culture. From this comparison, recommendations can be made to improve each one and provide another tool for future land development decisions. I used 30 years from now as the future time because that's how long it takes to harvest a plantation forest and it allows time for geothermal development too.

Indicator explanations

Soil: This includes industry affects on quality of soil as well as amount of erosion.

Fragmentation: Defined as the breaking up of previously connected land.

Air Pollution: These include direct emissions from forestry and geothermal sites into the atmosphere as well as indirect results such as transportation, development, and production

Native Species Biodiversity: It is important to recognize native species, as biodiversity alone would be a meaningless indicator without differentiating between exotic and native. This indicator reflects the health of native species in geothermal and forestry areas

Subsidence: Refers to the sinking of the land due to withdrawing resources, typically water. This also has the potential to reduce drainage and pollute waterways as geothermal development alters natural activity (Te Ara).

Surface features: "Hot springs, mud pools, geysers, fumaroles and steaming ground are associated with most geothermal systems"(KGDM). Both quantity and quality are assessed with this indicator.

Water quality: This measures whether geothermal or forestry is having a positive impact on surrounding water sources through withdrawal and disposal.

Waste: Amount of material, both solid and liquid that is left over and of no use.

Cash Flow: How much money is coming in versus being invested/going out. A positive number represents income while a negative number is loss/investment.

Employment: How many people are employed in the development and ongoing running of geothermal/forestry development in addition to job opportunities for locals.

Stability: This economic indicator is a measurement of the financial sustainability and consistency of a resource.

Living expenses: More specifically the food and energy costs for a household.

Land value: Monetary amount that the land is worth regarding forestry and geothermal development.

Kaitiakitanga: Sustainability of the resource for future generations.

Recognition: Ability for individuals to return to their home and accurately orientate themselves.

Va ahi tapu: The condition of sacred places in the CNI.

Ancestral connection: this may be too similar to recognition, but also includes ability to take part

in traditional geothermal/forest activities practiced by their ancestors.

Mana: Prestige associated with geothermal and forest resources.

Health and safety: How dangerous these resources are to work in as well be around.

Recreation: Recreation activities provided by forestry and geothermal industries.

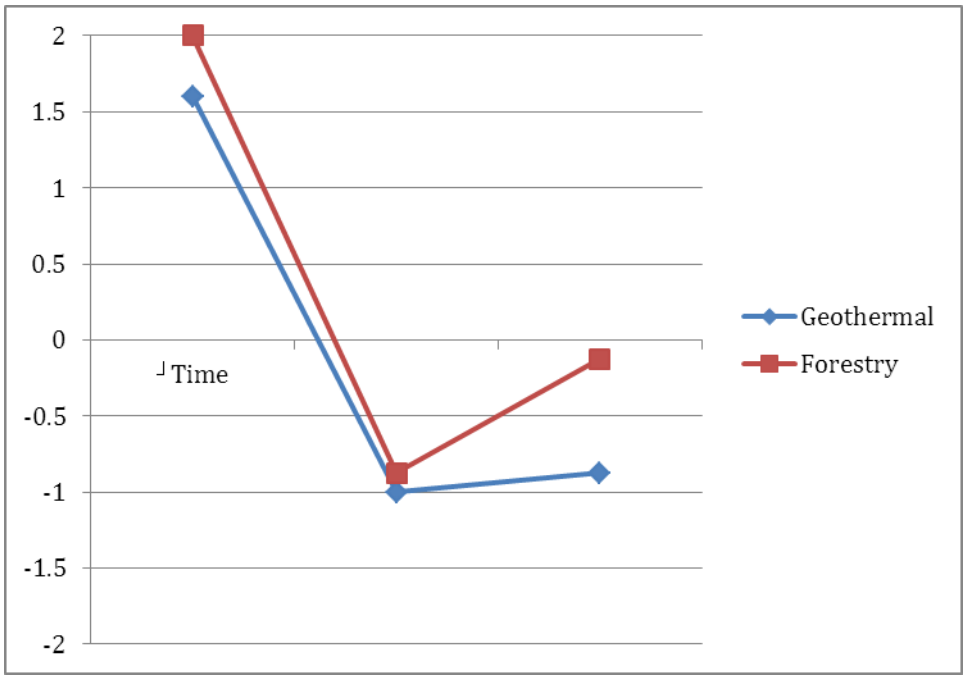
Aesthetic environment: How pleasant the landscape is to the eye.

Results

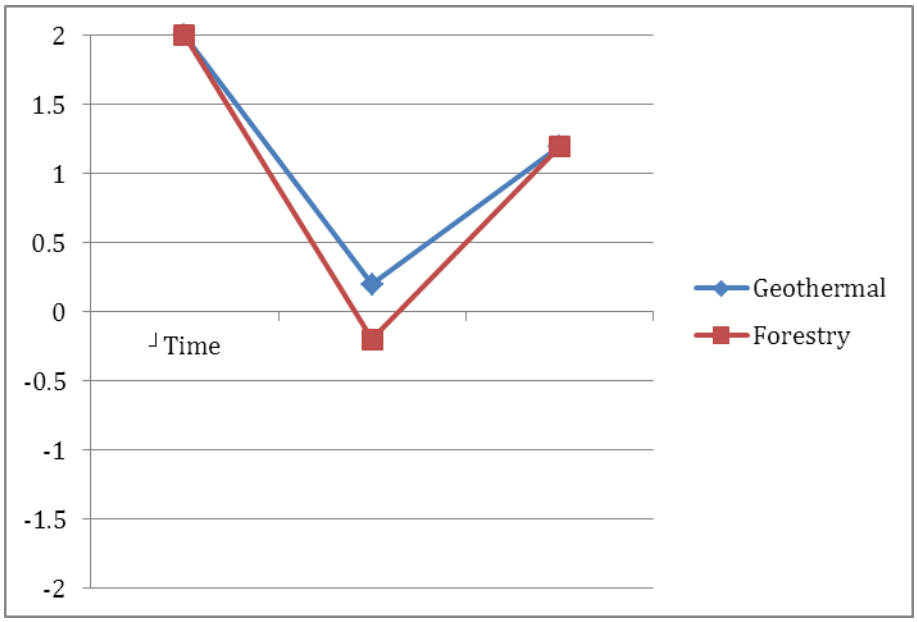
	Indicators	**Geo. Base**	**For. Base**	**Geo. Cur**	**For. Cur**	**Geo. 30 yr**	**For. 30 yr**
Environmental	Soil	2	2	-1	-1	-1	1
	Fragmentation	2	2	-1	-2	-1	-2
	Air Pollution	-1	2	-1	-1	-1	-1
Native species	Biodiversity	2	2	-1	-1	-1	-1
	Subsidence	2	0	-1	0	-1	0
	Surface Feat.	2	0	-1	0	-2	0
	H20 Quality	2	2	-1	-1	-1	1
	Waste	2	2	-1	-1	1	1
Economic	Cash flow	0	0	1	-1	2	2
	Employment	0	0	1	1	1	2
	Stability	2	2	-1	-1	1	1

	Living Expen.	2	2	1	1	1	0
	Land Value	2	2	-1	-1	1	1
Cultural	Kaitiakitanga	2	2	-1	-2	1	1
	Recognition	2	2	-1	-2	1	-1
	Va ahi tapu	2	2	-1	-1	-1	-1
	Ancestral con.	2	2	-1	-2	-1	-1
	Mana	2	2	-2	-2	1	1
Social	Health+Safety	1	2	1	-1	1	1
	Comm. Dev.	2	2	-1	-1	1	1
	Recreation	2	2	-1	1	-1	1
	Aesthetic env.	2	2	-1	-1	-1	-1
	Respect	2	2	-1	-1	1	1
	Results	**1.85**	**2**	**-.70**	**-.87**	**.2**	**.6**

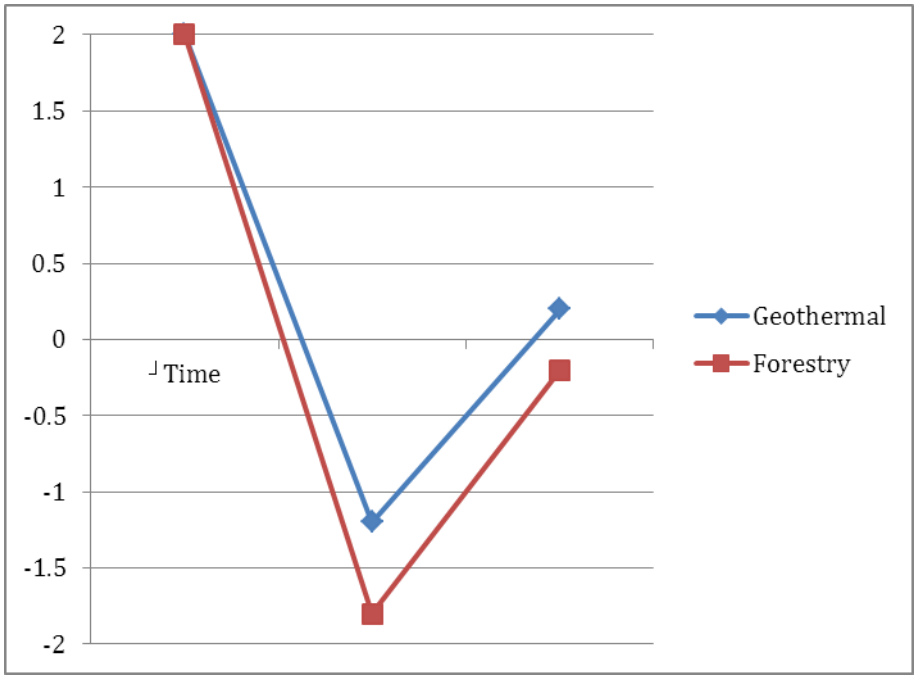
Environmental Averages



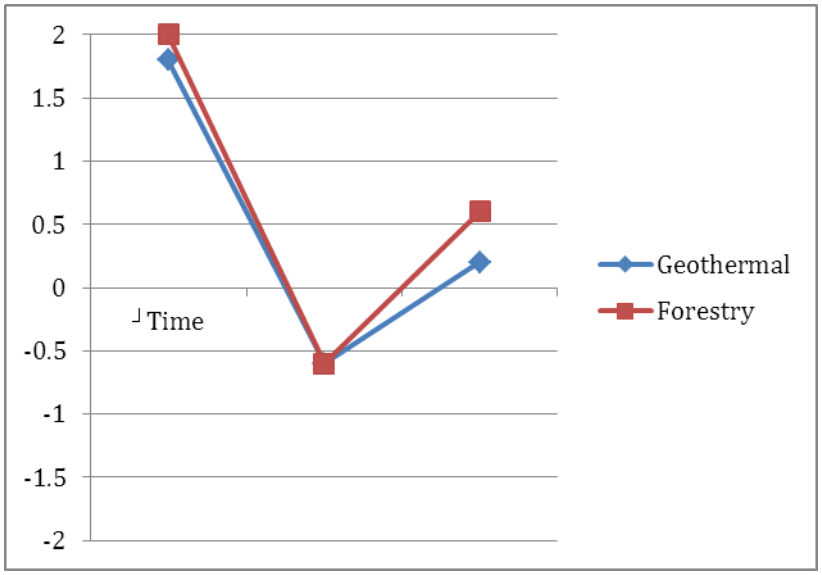
Economic Averages



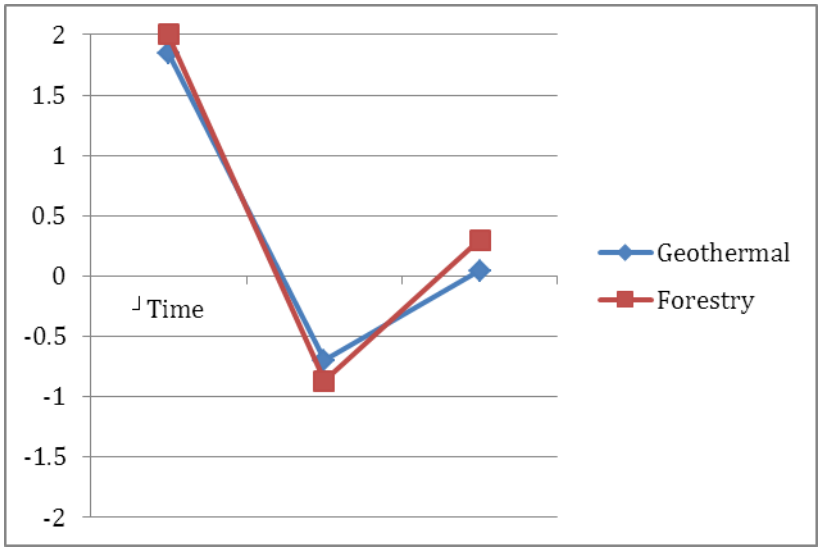
Cultural Averages



Social Averages



Overall Averages



Discussion

Given there are 23 indicators in this Mauri Model, explaining the rates of change for each one would decrease the effectiveness of this study. Therefore, I will attempt to highlight the indicators that are most significant in changing the environmental, economic, cultural, and social Mauri.

Environmental

The base environmental numbers are high considering the absence of industry and its effects. However, geothermal is slightly lower because of natural emissions into the atmosphere, which gives it a -1 for air pollution. One may think the forestry environmental number should be lower for the current point, but even though indigenous forests were largely destroyed, replanting timber plantations is not as harmful to the environment than if people left that area completely deforested. Geothermal environmental impacts will continue to diminish in the future because of the footprint required to develop geothermal. The reason forestry will be better off in the future is because new plantations will usually convert agricultural land, which has a worse affect on the environment than forestry, mostly through water quality and native species biodiversity. Forests can provide buffers to water sources, reduce erosion, and provide habitat for native species while agriculture tens to have greater erosion, runoff, and less suitable habitat (NZ Plantation Forestry Industry).

Economical

Initial measurements of geothermal and forestry's influence on the economy is very high, completely restored for both. It is important to note that cash flow and employment are disregarded in calculating the base averages because they are inapplicable to a pre-industry period. Stability, land value and expenses are given 2's because the Māori sustainably lived off the land by using the resources directly. Investment and stability are the two most significant indicators for the drop in Mauri. Investment for geothermal and forestry is very high, especially as forestry has a longer return on investment. As presented by the Tomorrow's Landscape strategy, forestry has an asset base of $3 billion, including $450 million in total operating costs

until year 30 when the timber is ready to harvest. Meanwhile, the cost of 7 geothermal plants is about $1.5-2 billion dollars, with a time horizon of only 5-10 years. In regards to financial stability, forestry is more susceptible to climate change, disease and market fluctuation, while geothermal is more consistent (Pryor 2010).

Cultural

With no forest and geothermal industries, cultural values were originally 2 for geothermal and forest resources. The drop-off represents an overall alteration of the landscape, it's use, and consequent affects. Forestry is lower than geothermal because it was fundamentally changed as opposed to simply altered. Indigenous forests were not utilized, but rather destroyed and replaced by different trees, predominantly radiant pine. This leads to a significant decrease in recognition and ancestral connection. The future is promising because mana and katiatanga should increase given the ownership kick started by the 2008 CNI Forest Collective for both geothermal and forestry developments.

Social

The only reason geothermal is slightly lower to begin with is because of heath and safety concerns, such as hydrothermal eruptions, seismicity, hot pools, and noxious gas. Aesthetic degradation is a huge factor in decreasing the social values of geothermal and forestry as the implementation of geothermal plants and forestry procedures creates a large eyesore compared to pre-industrial levels. Given the income created by geothermal and forestry, in the future the community should benefit from more developments and improvements such as schools.

Conclusions

As a result of little time and lack of resources this research faces several limitations. For one, I am not conducting any interviews so I have to rely on current information rather than develop data based on first hand accounts. Secondly, by focusing solely on geothermal and forestry, I am neglecting other industries that have affected Māori populations, such as dams and hydroelectricity. Moreover, while 30 years is a significant number for geothermal and harvesting activity, Māori consider generations important, not necessarily a measurement of 30 years, as their ideology is more long term. Lastly, the scope of this project leads to a fair amount of speculation especially regarding the future impacts to Māori. For instance, there is much uncertainty about how much forthcoming technology will improve.

The overall average graph represents a complete picture of the state and change in Mauri regarding geothermal and forestry. Forestry and geothermal follow similar trends because these industries represent an overall negative altercation to geothermal resources and forest resources, specifically indigenous forest. However, both are enhancing in year 30, which shows two key points. For one, there has been a change in mindset. Yes, things got worse from baseline to the current, but now that we live in a day and age where energy is extremely important, it is unrealistic to think exploitation of geothermal and forestry resources will not happen. Rather, sustainable management of these resources is needed, and if they are, it will have an enhancing effect on the Mauri in the future.

Greater ownership opportunities is the other trend supported by the data and is largely attributed to the passing of the 2008 CNI Forest Collective. By owning more resources, Māori groups can benefit by better managing them according to their beliefs. No longer are they

always susceptible to the choices of others. Of course, this is not possible without a shift in mindset, in which they realize the importance of these resources in the context of the modern world in addition to their traditional beliefs. For example, there is a joint venture between Tauhara North No. 2 trust and Mighty River Power with the Ngatamariki geothermal plant. Moreover, CNI Māori have decided to end the lease between their land and the trees owned by Kaingorae Timberlands, meaning after their harvest, the Māori will plant trees and successfully own both the land and the trees in the future. More examples like these are likely in the future. The change in mindset and greater ownership of forest and geothermal resources explains why environmental, economic, cultural, and social conditions can be enhanced even though those resources will never be back to their original state. This assessment of geothermal and forestry development in the CNI is a useful broad template for future growth decisions.

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Appendix

Figure 1: Central North Island Area

Figure 2: Taupo Volcanic Zone in the Central North Island

Figure 3: Geothermal Production Model

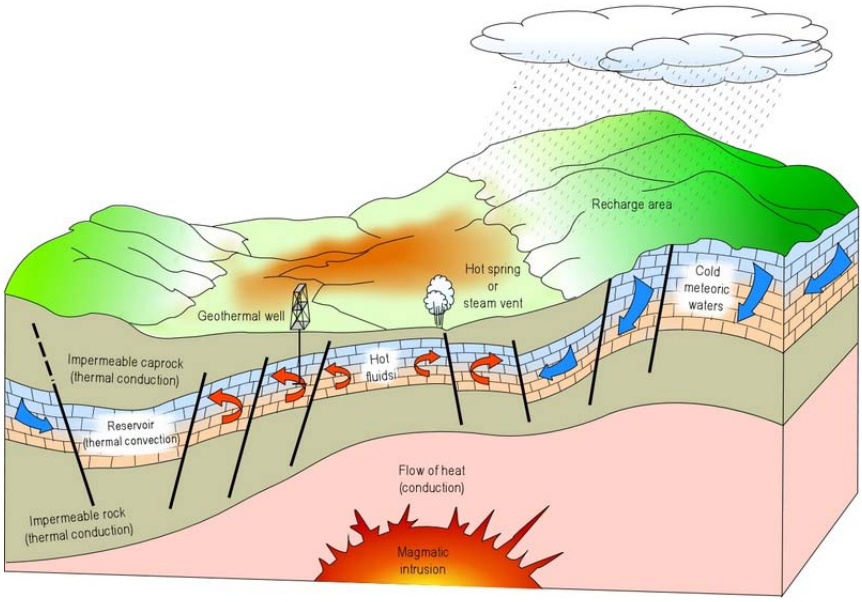

Figure 4: Pre-human to 2002 Indigenous Forest Cover

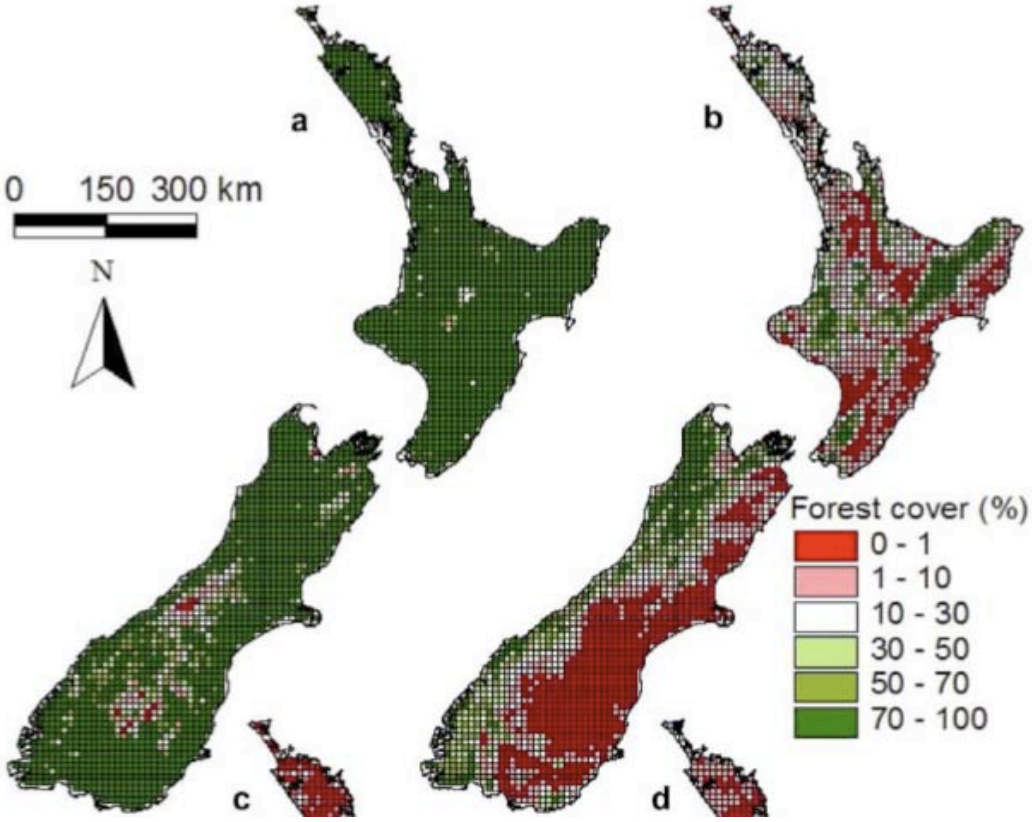

Figure 5: The Plantation Forestry Process

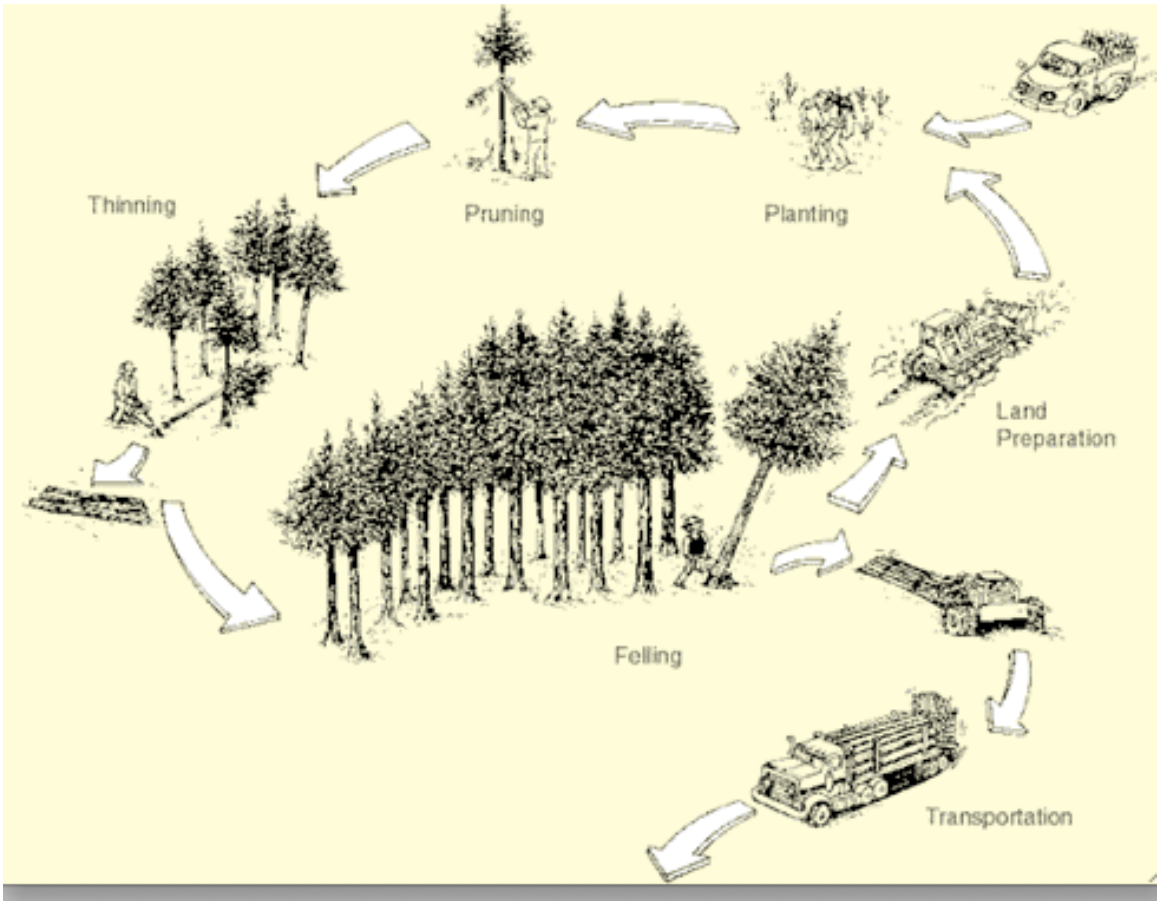

Figure 6: Mauri Model Barometer

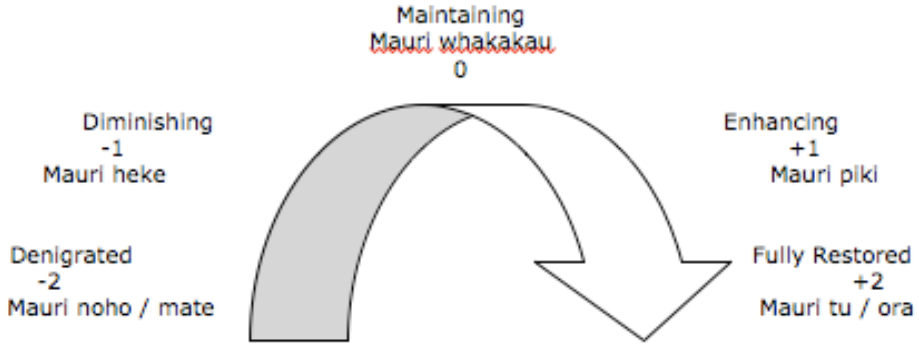

Figure 7: Menominee Venn Diagram

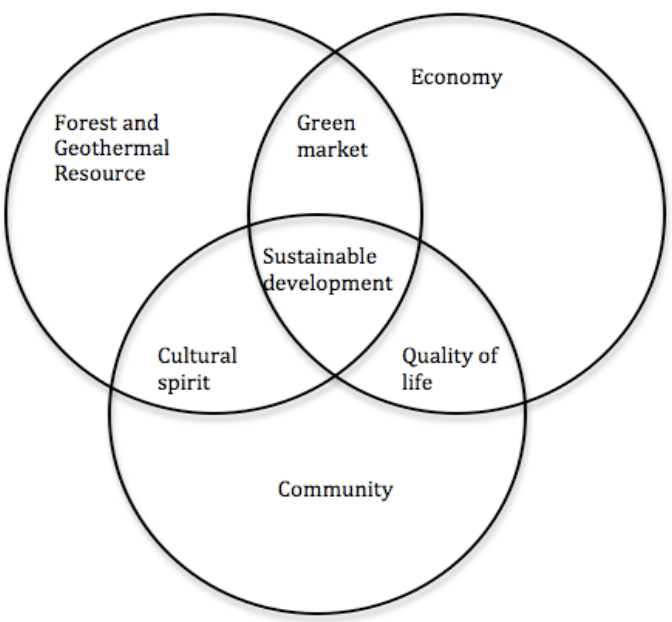

Figure 8: Economic Table from Tomorrow's Landscape

Commercial type	**Annual cash flow**	**Asset base**	**Time horizon**
Forestry	$100-120 million	$3 billion	25-30 years
Geothermal	$170-200 million	$2 billion	5-10 years

Acknowledgments

I would like to thank everyone from Frontiers Abroad for their support and a special thanks to Dan, Jan, and Kepa for their guidance.