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Integrating Indigenous Values into Geothermal Development

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ABSTRACT

There are many strong reasons for pursuing geothermal energy – it is renewable, sustainable, reliable, and cost effective. Recent technological advances have dramatically expanded the range and size of viable resources, reduced the risks – both economic and environmental, via comprehensive exploration and modeling and thus created the potential for widespread development. A possible limiting factor is land access – for example in New Zealand most of the undeveloped high enthalpy resource is situated on/in multiply owned Māori (indigenous people of New Zealand) land. Māori views of land, landownership and resource development differ from those of standard 'western' thinking. Integrating indigenous values into geothermal development approaches may facilitate progress.

Introduction

All indigenous peoples have a tradition of unity with the environment and have developed their own views of ecosystems throughout human history. Most of them based in traditional knowledge systems, which they use to understand and interpret their own biophysical environments (1,2). These systems of living as a part of and managing the environment constitute a key part of the cultural identity and social integrity of many indigenous peoples (1,3,4). Additionally, indigenous knowledge embodies a wealth of wisdom and experience of ecosystems gained over millennia from direct observations, and transmitted – most often orally – over generations (1,3).

With increased pressure on the world's resources and ecosystems, the importance of employing indigenous knowledge for the security of biodiversity and the realization of sustainable development is becoming recognized internationally (1,3,5,6,7). There is also an increasing international demand for transparent and stakeholder sensitive decision-making processes (7). This shift in the decision-making paradigm affords the opportunity for discussion of a sustainable future for the planetary ecosystem and consideration of more holistic approaches to decision-making worldwide (i.e. based on indigenous knowledge concepts). An integrated indigenous knowledge and science approach may provide the path forward.

An indigenous approach to development has its own ethos, ethics, set of principles and practices appropriate to an intergenerational sustainability strategy that incorporates the quadruple bottom-line of economic well-being, environmental well-being, social well-being and cultural well-being. These are a different paradigm to that of a typical Western-Anglo approach, and therefore minimise or even preclude engagement with many indigenous peoples for a range of development options e.g. mineral extraction. Conversely, the reputation of Geothermal Energy as renewable and sustainable makes it highly desirable to many indigenous peoples.

The New Zealand Setting

The indigenous people of New Zealand, the Māori, have utilised geothermal waters and materials for centuries. In contemporary times only few groups have undertaken development (e.g. electricity generation) of their geothermal resources – which seems at odds with the sustainable and renewable attributes of geothermal energy. A potential barrier to development has been a clear pathway that accounts for an additional responsibility that Māori decision makers have – that of *kaitiakitanga*, the closest translation of which is 'guardianship'. Kaitiakitanga has a broader definition of acting to enhance mauri, where mauri is the binding force between the physical and meta-physical attributes of an entity (8). Kaitiakitanga was the word used by Māori to define conservation customs and traditions, including its purpose and means (9).

The concept of kaitiakitanga played a crucial role in traditional Māori society, and is increasingly sought as an environmental paradigm in contemporary settings. As kaitiaki (guardians), Māori were responsible for ensuring the viability of land and resources

for the following generations. Guidelines and methods were developed to meet the needs and requirements of traditional Māori communities for whom the kaitiaki were responsible.

The responsibility manifests itself in many ways including:

1. Restoring and maintaining the mana (prestige) of the people, i.e. assuring actualization by helping them to develop their potential. The full mana of the Māori is directly related to their role of kaitiaki;
2. assuring the sustainability and the long term use of their taonga (all the natural resources of their land);
3. protecting the fragile elements of their ecosystems;
4. replenishing and assuring the provisions of sustenance for the future generations;
5. planning and supervising all commercial developments with the tribe;
6. developing educational programs to explain the interrelations between all the elements of their living taonga (e.g., lands, seabed's, foreshores, water, air, geothermal, animals and human beings) and to help people understand how the imbalance or destruction of one element can seriously affect all the others.

The kaitiaki must make sure that the mauri or vital principle of their taonga is healthy and strong. Living in a particular geographic area for centuries allowed Māori to compile a huge variety and quantity of detailed knowledge related to the land, it's resources and its inhabitants. That knowledge has been transmitted orally through generations. It allows a rigorous evaluation of the mauri of their ancestral lands.

To sustain their mana, the tangata whenua (literally 'people of the land') must play their role of kaitiaki and do everything they can to preserve and enhance the mauri of their land. This includes restoring it to its original state if it has been altered by use.

The Solution

To address this local issue we are creating a geothermal development model that meets both governmental consenting requirements and also accounts for Māori obligations (e.g. kaitiakitanga principles). By neccesity the model has been constructed around the New Zealand legislative framework that pertains to geothermal systems and development – mostly the Resource Management Act (1991 and 1997 and hereafter referred to as RMA) but also the Local Government Act (2002). The major outcome of this project will be a geothermal development model that integrates geothermal science, engineering, appropriate governance and management systems with investment opportunities – all underpinned by kaitiakitanga amd indigenous Māori knowledge.

To achieve this we will be using a decision-making framework (DMF) that is designed to afford all stake holders a voice and which can also assess the 'sustainability' of various develpoment options during the planning stage. New Zealand legislation indicates that sustainable development should be holistic and promote social, economic, environmental and cultural well-being. The combined contributions of the two knowledge systems (science/engineering and indigenous knowledge) provides the potential for integrated decision making that can enhance the practice of sustainability for the benefit of our future generations, and find solutions for problems associated with exploiting and managing the resource that cannot be provided by either knowledge system in isolation. In order to be effective the DMF should be effects focused i.e. income derived from geothermal development, cessation of springs, and promote social, economic, environmental and cultural well-being (7). The DMF should be accesible by all parties engaging/intending to engage in geothermal development e.g. iwi groups, landowners, geothermal companies, regulatory bodies, to ensure active participation in the decision-making process (7). Therefore, the DMF must be easy to understand and simple to use (7) (e.g for non-technical parties/individuals) yet robust enough to withstand technical and judicial scrutiny.

The DMF we are using is the Mauri Model (7) which was created to improve water management processes by making them inclusive of all knowledge sources available. The Mauri Model (7) is a two step process – the first identifies bias in world views and the second step assesses the absolute sustainability of proposed actions/activities, and it provides the structure of the Kaitiaki Geothermal Development Model (which the authors are currently developing). The RMA in New Zealand requires any activity (i.e. development of a resource) that impacts or effects the environment, requires a consent – and that consent must address the four well-beings – economic, environmental, social, cultural. The first step in the Mauri Model process is to apply relative weightings to each of these four well-beings to reflect the relative importance given to social, economic, environmental and cultural well-being (7). In the RMA the four well-beings are referred to in different orders throughout the document – indicating equal status. However, the allocation of equal weighting to each well-being has little validity as the lack of bias between them assumes that these dimensions have equal importance in the real world (7). For example when the DMF has been used in New Zealand, planners and engineers typically assign a 70% weighting to economic well-being, with the remaining three well-beings assigned ~10% each. Conversely typical weightings assigned by Māori groups are 35% environment, 30% cultural, 20% social and 15% economic. The second step involves identifying indicators of potential impacts of geothermal development – both positive and negative, and then by using an analytic hierarchy process (10) we can assess the sustainability of the combined effects of the indicators. At this final assessment stage the biases identified at the first step can then be incorporated collectively, and individually, to identify where the 'world views' (e.g. planners and Māori groups) differ greatly. Further, the process allows individual indicators to be viewed separately, allowing identification of those with potential for greatest impact. Assessment of the impact to mauri of each indicator (e.g. income from selling electricity, cessation of springs) is made on a coarse -2 to +2 scale as shown in Figure 1. If an indicator is deemed to have a positive effect it scores as either +1 or +2, conversely if it has a negative impact it scores -1 or -2. If no impact is deemed likely a 0 score is given. An example of a positive impact would be income, and a negative impact would be cessation of springs. Geothermal springs are afforded a very high status by the Māori people of New Zealand for numerous reasons. Arguably the most important is that the livelihood of their ancestors depended upon them and thus without them the people might not exist today. Ancestors bathed in and were warmed and

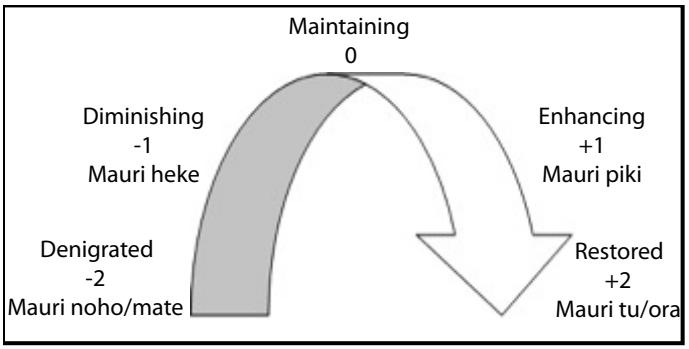

Figure 1. Absolute Sustainability Assessment using the Mauriometer.

cured in springs. In addition, Māori survived on wildlife (food) and materials (clothing and housing) and lived in close proximity geothermal springs.

Mauri Model assessments of two hypothetical geothermal developments are shown in Figure 2, with an equal weighting given to each of the well-beings. The status quo assumes some people with ancestral connection living in their respective areas. Group 1 possesses some springs that are flowing and have not waned. Group 2 possesses some springs that have not waned and others that have ceased to flow. An assessment for a proposed development with a temporal component to show an assessment for thirty years into the future – 2040 is shown in Figure 3. Thirty years is an appropriate number as consents are often given for this time period, and thirty years is also the 'lifetime' of a geothermal plant (lifetime of infrastructure not the resource – the Wairakei geothermal power station just celebrated its 50th birthday). The data show that the proposed activities will have an immediate overall positive impact. Furthermore, through the cumulative effects of having viable, stable employment opportunities 'back home' and the income from that employment, entire communities begin to thrive. This is particularly apparent in the 2040 assessment.

	Indicator	Status Quo	Group 1	Group 2
Environmental	Surface Features	0	0	-1
	Waste Water	0	0	0
	Subsidence	0	-1	-1
Economic	Cost/Benefit	0	+1	+1
	Cash Flow	0	+1	+1
	Employment	0	+1	+1
Cultural	Ancestral Connection	+1	+1	+1
	Kaitiakitanga	+1	+1	+1
	Returning Home	-1	+1	+1
Social	Sustainability	0	+1	+1
	Community Resilience	-1	+1	+1
	Aesthetic Environment	0	-1	-1
	Results:	0.00	0.5	0.42

Figure 2. A hypothetical Mauri Model assessment of Geothermal Development.

The appeal that the Mauri Model has for geothermal development lies in its simple structure and the facilitation of engagement with those who own the resource. Furthermore the Mauri Model helps identify or justify new solutions or approaches, and affords the opportunity for all parties to 'get on the same page'. Finally, the Mauri Model is built from established engineering and systems thinking and is robust.

In practical terms most of the standard requirements for geothermal development are synchronous with indigenous approaches to development. For the most part the key concepts are the same – the differences lie in the detail. The aim of development is to enhance value and/or make money from geothermal as a renewable resource. This means extracting fluids from a geothermal reservoir at a rate less than that which it is being replenished and/or which will not detrimentally effect production of power. In practice this is a multi-decadal timeframe, governed by returns on investment, consent duration and plant lifespan. An indigenous approach to development has, as one of its core values, an intergenerational aspect – which is in general in agreement with a multi-decadal timeframe, but tending more toward a centennial time-frame.

	Indicator	Group 1 2010	Group 1 2040	Group 2 2010	Group 2 2040
Environ-mental	Surface Features	0	+1	-1	+2
	Waste Water	0	0	0	0
	Subsidence	-1	0	-1	0
Economic	Cost/Benefit	+1	+2	+1	+2
	Cash Flow	+1	+2	+1	+2
	Employment	+1	+1	+1	+1
Cultural	Ancestral Connection	+1	+1	+1	+1
	Kaitiakitanga	+1	+1	+1	+1
	Returning Home	+1	+1	+1	+1
Social	Sustainability	+1	+1	+1	+1
	Community Resilience	+1	+2	+1	+2
	Aesthetic Environment	-1	-1	-1	-1
	Results:	+0.5	+0.91	+0.42	+1

Figure 3. A hypothetical Mauri Model assessment of Geothermal Development, including a 30 year temporal component.

The Kaitiaki Geothermal Development Model

The Kaitiaki Geothermal Development Model (KGDM – currently being developed) is built around the Mauri Model which it uses for the initial engagement. It builds upon the Mauri Model by incorporating indigenous timeframes and ideas into plant design, development, management and financing structures. To date all Māori geothermal development has been undertaken in collaboration with industry partners. The key issues that hinder geothermal development were recently outlined at the New Zealand Geothermal Workshop – consultation (between geothermal companies AND Māori groups), consensus (between geothermal companies AND Māori groups) and consenting (between joint ventures comprised of Māori groups and geothermal companies AND regulatory bodies). We believe that the KGDM will address all of these issues, as outlined below:

1. Consultation & 2. Consensus

The KGDM is based upon tikanga Māori (Māori views and practices) and affords all (not just Māori) stakeholders a voice. As such we envisage that the time taken for the consulting process would be significantly shortened. In addition, within the tikanga Māori approach is the concept of kotahitanga – unity, and the

strength and surety that results from reaching kotahitanga. Finally, a strength of the KGDM is that it not only focuses on the similarities, but also easily identifies any minor issues in the process, affording the opportunity to deal with them appropriately and in a timely fashion.

3. Consenting

The use of the KGDM from the outset will ensure that objections to the consent will be minimised. Furthermore, we will be working closely with the consenting personnel in the regulatory bodies (Environment Waikato and Environment Bay of Plenty) during the development of the KGDM to ensure that the process is as streamlined as it can be.

The combined effects of the KGDM are to 'get everybody on the same page' very early and allow the process to operate. We anticipate finalising the KGDM and implementing it into a geothermal development project by mid 2011, with widespread usage in New Zealand closely thereafter.

International Utility

The utility of the Kaitiaki Geothermal Development Model for other indigenous peoples has yet to be tested, but we are confident that if not the entire model, as least portions of it will be universally applicable. Our confidence is based upon the strong similarities of indigenous values and practices worldwide. Furthermore, based on our efforts to date, we have been in contact and preliminary discussion with Native American, Chilean and Filipino groups who aspire to develop their geothermal resources.

Conclusion

Widespread use of KGDM in New Zealand will lead to greater geothermal development due to its effective integration of the indigenous landowners obligations as kaitiaki (guardians) with legal consenting requirements. Its use is attractive not only to allow engagement with landowners, but also to facilitate a timely decision making process. The international utility of the KGDM is dependent upon two factors; 1. the concordance of indigenous views and practices with those of the Māori and 2. the similarity or suitability of legal frameworks to accommodate the principles of the KGDM. As outlined above strong similarities of values and practices exist between indigenous groups worldwide. A similar legal framework would be the most ideal, however, the integrative nature of the KGDM ensures at the very least, an effective facilitation. Once the shape and structure of the KGDM is further advanced in New Zealand, we will explore an international implementation plan.

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