

FUTURE GEOTHERMAL ENERGY DEVELOPMENT IN THE EAST AFRICAN RIFT VALLEY THROUGH LOCAL COMMUNITY INVOLVEMENT: LEARNING FROM THE MAORI'S EXPERIENCE

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ABSTRACT

The East African Rift Valley (EARV), extending from Eritrea in the North to Mozambique in the South is one of the key regions in the world for potential geothermal energy development. The region is still at an early stage in regards to geothermal development, with the first plants having operated for a few tens of years and others just recently commencing to produce, resulting in a total production of a few hundred MWe. Important perspectives should be drawn for the future given that production figures of several tens of thousands of MWe are being projected. Essentially based on large size plants answering the needs of the inter-connected electric network, the current development approach raises the question of relations with local communities living around geothermal sites targeted for development.

Worth noting, is also the fact that due to the geological characteristics of the EARV, the geothermal resources are located in low lands along the floor of the Rift Valley and Afar depression, which are areas of low altitude where the climate is generally drier and inhabited by various pastoralist communities that have adapted to the arid conditions. These communities include the Maasai in Central and Southern Kenya as well as in Northern Tanzania, the Pokot in Northern Kenya and the Afar in North Eastern Ethiopia, in Eritrea and in Djibouti.

In the current geothermal development approach, the social issue is treated in terms of compensation, with the local communities being consulted after project design and implementation decisions have been made; and with the ultimate aim of the consultation at this late stage, being to eventually compensate the local community for the negative impact the project causes to their day to day social and economic lives.

This paper aims at recommending revisions to this current approach, by proposing that local communities should not just be viewed as subjects of project impacts, but as key actors of geothermal development. This also implies considerations that these natural resources found on their land are already generally well-known and being appropriated by the community members for various applications (such as water production by steam condensation, therapy, cultural practices, etc...).

In the frame of ongoing research, a procedure is being tested in which the interests of local communities are taken into account at the earliest stages of project conception (i.e. reconnaissance and pre-feasibility). The proposed approach entails enhancing local communities' knowledge regarding geological resources as well as types of possible uses that could be considered to respond to their socio-economic needs. Taking into account the traditional roles within these local communities, gender considerations appear to be particularly pertinent.

To this respect, existing experience of participation of local communities in geothermal energy development in other parts of the world provides references that can be of relevance and interest along

the EARV. For instance, the case of the Kawerau Geothermal Power Plant in the Bay of Plenty Region (New Zealand) is an example, among several others, of a case that has been extensively studied in this regard. Completed in 2008 at a cost of NZ\$300M, this 100MWe is the largest single generator geothermal plant in New Zealand. Besides power generation, it also supplies process steam to a large pulp and paper mill. Important to note is the fact that: This plant is owned by a Maori Trust (the Maori being an indigenous group of New Zealand that settled there in the 1300's, long before the British colonisation). Presently, there are at least five Maori Trusts owning geothermal plants of various sizes and types, including a touristic "Geothermal Village". This situation has been the result of a long and significant process.

The process involved among other things policy change, attending to historical injustices around land issues and a genuine political will to meaningfully engage the local community in addressing their long-term socio-economic interests. This paper analyses the case as an example of a process of community-based geothermal development that could inspire the equally indigenous local populations along the EARV.

INTRODUCTION

With its huge and exceptional geothermal potential, the EARV will become one of the major geographic areas in the world where this climate friendly, non-intermittent, renewable energy is widely used. While geothermal energy development is currently at initiation stage in the EARV region, it is nevertheless an opportune time to consider this issue with a long-term view, with the aim of taking necessary immediate measures to transform to a sustainable form of development. This means a form of project implementation that is in line with the 3 pillars of sustainable development: economic, environmental and social. This social aspect covers a range of parameters, generally taken into account by the developers, financing agencies and the concerned public authorities, and include job creation, facilitating electricity provision at reduced price, which in turn promote its access for the poorest. In all this, geothermal energy has another advantage which should be of particular interest to the Eastern Africa region: it allows for the development of diversified direct uses, and eventually serves not only large units for the grid, but also autonomous projects of integrated development, such as the "geothermal village" project (Omenda et al., 2013).

A significant amount of geothermal development is projected to take place along the rift valley, which is also known to be land of pastoralist communities who have over hundreds of years lived in these lowlands, and adapted to their arid climatic conditions, including using artisanal means to get geothermal energy to respond to their traditional socio-economic needs such as water condensation, washing, cooking, etc...). Taking this into account, the direct involvement of these indigenous people should not only be regarded as an obligation required by international laws, but also as a condition for real sustainable development.

To this respect, the example of the Maoris in New Zealand is of interest. Initially neglected by the State developers, the Maori Trusts now own 5 major geothermal plants, some of which are the most significant in the country. Two (2) of these plants are applied in direct use projects, such as wood drying as well as pulp or dairy productions. The process of appropriation of geothermal energy by the Maori, who also were the first users of these natural resources in New Zealand, is of interest for the EARV region. The aim of this paper is to show how and why.

1. RENEWABLE, CLIMATE FRIENDLY ENERGY, AND SUSTAINABLE DEVELOPMENT WITHIN THE AFRICAN PASTORALIST CONTEXT

Humanity is entering a new era, radically different from what has been prevailing for the last century. From a developmental approach based on fossil energy resources (which still represents 75% of the world consumption), we have to shift to renewable energy sources for two reasons: i) depletion of the most accessible fossil fuels (the peak oil) and ii) the effect of the combustion of these carbohydrate

products on the atmosphere (climate change due to increased and continuous green-house gases emission).

If renewable energies (hydro, wind, solar, marine and geothermal) are technically and economically able to answer the future needs, they differ from previous experience based on fossils (or nuclear) in the fact that the production is as widespread as the consumption, with of course opportunities to benefit from “short circuits” for local developments based on diversified (eventually “en cascade”) use of the resources. However, this kind of development is not always considered, or even known, by the developers themselves (mostly large companies backed by international or bilateral financing organisations) who frequently still regard renewable energy projects in terms of the traditional ones (large dams, large wind farms or solar panels, producing MWe for the grid, serving cities and areas of development, not primarily local population). The present approach to geothermal development falls in this category.

With this present approach, it is ironically therefore not a “given fact” that promoting renewable energy necessarily translates to a sustainable form of development! Sustainable development should rely on 3 pillars, including the social one (Fig. 1). In light of the approach of the “Agenda 21” – the U.N. implementation process of sustainable development - project development should involve the participation of all concerned parties who have a stake in the undertaking, in other words, all stakeholders. Stakeholders include the investors, the relevant energy entity (public or private), governments, as well as all the societal groupings present in the target geographic area, including men, women, children, Non-Governmental Organisations (NGO’s), private enterprises, unions, religious leaders, and all other forms of potential stakeholders.

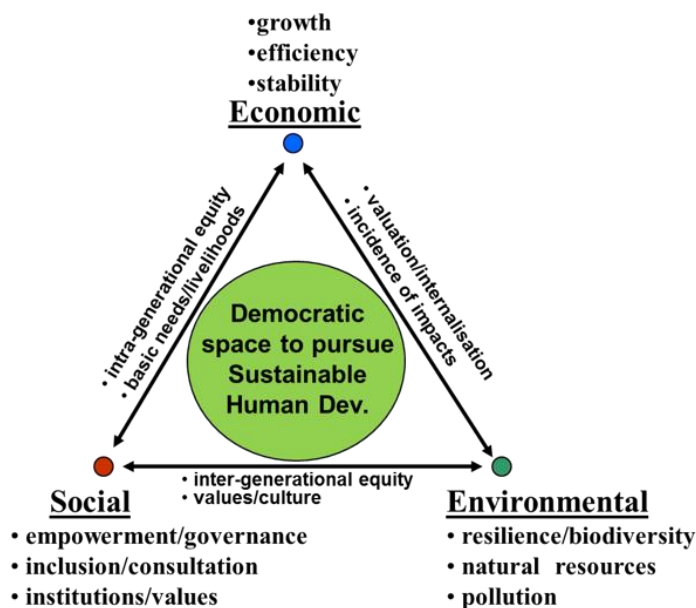


Fig. 1: The sustainable development triangle (Source: Munasinghe, Rio Earth Summit, 1992).

Sustainable development heavily relies upon a democratic approach employed at all levels in the society: from local, to regional up to national level. Characteristically, indigenous peoples; including pastoralist communities have for a long time generally internalized the values represented in the sustainable development triangle, particularly the social-environmental link. Their balanced relations to natural resources, as well as a resilient approach with inclusion and empowerment are known to be key for the sustained economies of these communities.

However, in the case of renewable energy developments, and in particular that of geothermal energy, the process encompassing the sustainable development triangle needs to pass through several rather technical phases (ie reconnaissance studies, pre-feasibility, feasibility studies), which are eventually costly (and far beyond the financial capacities of these local communities). There is a specific need

for information, awareness raising and education so as to build the capacity of local communities around geothermal sites to effectively play their part in such processes of social change. This is particularly the case for these indigenous people, who, for centuries, have been kept away from educational facilities, and are historically regarded as being prone to resisting development. As underlined by Crawhall (2011): *“One of the side effects of the elaboration of that ideological justification for colonisation was the idea that there is a temporal and hierarchical order to the world, where hunter-gatherers are seen as the most savage (and hence inhuman, without citizenship, rights or dignity), moving upwards through nomadic pastoralism, to agro-pastoralism, to subsistence agriculture and eventually to feudal agricultural and trading empires which existed in several parts of Africa by the eighteenth century. This bias is maintained in modern African law, with legal and constitutional systems failing to recognise traditional resources rights of mobile indigenous hunters and herders or their traditional governance institutions. Even though transhumance is an important adaptive technique for African climates and ecosystem maintenance, this is not reflected in land tenure laws, which are for the most part based on colonial legislation and norms.”*

2. GEOTHERMAL ENERGY DEVELOPMENT IN THE EARV: A TECHNICAL BUT ALSO A SOCIAL CHALLENGE

Geothermal energy development raises scientific and technical issues that require high level expertise and structured methodology. The time-span observed in Africa, and other parts of the world, between the first reconnaissance and a real industrial and economic development made it necessary to develop regional institutions (such as African Rift Geothermal Development Facility <ARGEo>) in order to share experiences and good practices. An approach to geothermal development based on successive steps that help to minimise the technical risks and adjust investments to facilitate increased knowledge of given geothermal resources could be shared with the aim that it will ultimately promote its being recognized as an appropriate methodology. In this approach, reconnaissance work of wide areas using inexpensive tools (regional geology, geochemistry of hydrothermal fluids) facilitate the selection of smaller size sites to be targeted for more comprehensive studies (concentrated on geology, mineralogy, geochemistry, geophysics, including eventually slim holes) at the feasibility stage. The turning point is the feasibility study that necessitates drilling the reservoir to have production by several wells, which will be tested for a long enough period to determine the characteristics of the reservoir and of its fluid, determine the engineering of the geothermal field, the size and overall economy of the power plant, and eventually plan further industrial development (Fig. 2).

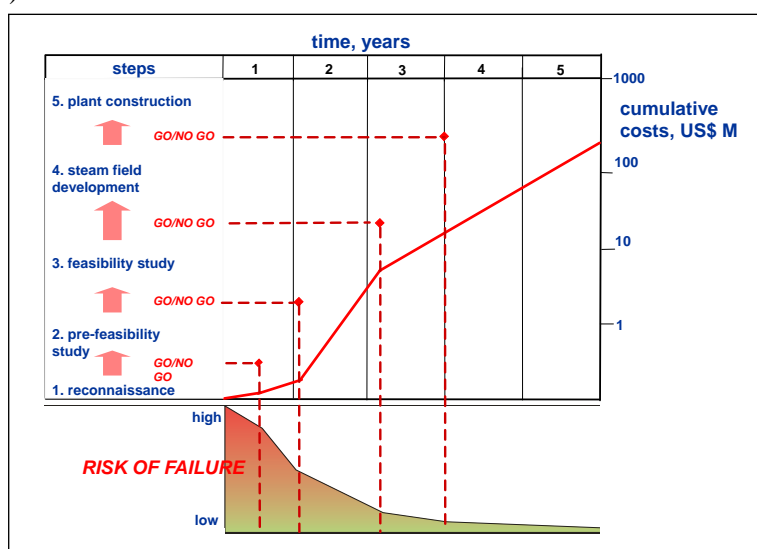


Fig. 2: The steps in geothermal development, aimed at proportioning the technical exploration costs to the risks (Source: GRMF)

It should be noted that this approach is driven by purely technical/economical parameters, similar to the ones encountered in the approach of mining projects in which the geological parameters are the determinants of the mere existence of a project.

This approach of high enthalpy geothermal systems, differs from the one adopted for low enthalpy projects, in which the first determinant for the mere existence of the project is the local community's demand, and which is the approach advanced by this paper, as it promotes the involvement of all stakeholders (including local community) from the very initial stages of geothermal development. In such cases, as encountered in France for example, geological studies will only be developed once the characteristics of the demand have been studied and analysed. The demand (in size and temperature levels) will determine the geological target to be searched through geoscientific methods. Moreover, the project will be engaged at the request of a client who is based on the site, and who will amalgamate the demands of the various potential stakeholders. This client will generally be an ad-hoc, and locally created local geothermal company (generally of “*Société d'Economie Mixte*” implying the concerned municipality – i.e. public-private partnership - status).

In contrast, in the case of geothermal projects as presently conceived in Eastern Africa, a social and environmental impact study will, at the feasibility stage, be undertaken at the request of the respective donor agency and/or Ministry (often the ministry concerned with environmental issues of the given country). This implies the consultation of the local population in the target project area, at this stage of the cycle of the proposed project. This approach implies that impact should ultimately be measured, using economical tools, which serve to determine the compensation to be paid by the developer to the concerned population. It is the approach that prevailed for instance in Olkaria, where 3 Maasai villages (with permanent stone houses of urban style; presumably cleaner and more comfortable than the traditional Maasai housing) were, as part of compensation, constructed away from the geothermal field being developed (Fig. 3 & 4).



Fig. 3 and 4: Traditional Maasai village compared to the newly built village for the population displaced from Olkaria.

There are however indications that in the past two years or so, the “template” that has in the past informed the approach to geothermal development has in a way been evolving.

In the “Geothermal Proclamation” recently (August 2016) adopted by the Ethiopian Federal Parliament, article 42 articulates that: “A *Geothermal Resources Use License* shall include a written community development plan, developed by the Applicant in consultation with the communities existing in or adjacent to the License Area. Such a plan shall include an implementation plan including allocation of funding to support community welfare”.

In the Geothermal Risk Mitigation Fund (GRMF) Procedure managed by the African Union (AU) under the European Union (EU) financing – and which supports surface exploration and exploration

drilling - presented in June 2016 and valid for the 2016 call for projects, the environmental and social dimension was reinforced. Eight Environmental and Social Performance Standards (PS1 to PS8) were established; five (5) of which are concerned with social aspects. These 5 are: PS1: Assessment and Management of Environmental and Social Risk and Impacts, PS4: Community Health, Safety and Security, PS5: Land Acquisition and Involuntary Resettlement, PS7: Indigenous People and PS8: Cultural heritage. It specifies that:

“- Developer is required to prepare and implement a continuous process of stakeholder engagement to be built into project planning and implementation,

- Information exchange with all identified stakeholder groups before the beginning of the project and at key decision-making points,

- Inform about project's risks and impacts,

- Consultation of affected communities during project implementation to allow for expression of their views on project risks, impacts, and mitigation measures,

- Stakeholder Engagement Plan: formal description of this approach,

- Special Case: Indigenous People:

- Assessment at the very outset of the project whether indigenous communities are present in the wider concession area.*

- If so, apply the principle of free, prior and informed consent (FPIC)”*

In a paper titled “The Right to Free, Prior, and Informed Consent: Indigenous Peoples' Participation Rights within International Law” Tara Ward (2011), having studied a set of mining cases worldwide, concludes that *“the size of the gap between the norms being developed within international human rights jurisprudence and State practice. If FPIC, as stated earlier, is intended as a way to ensure meaningful engagement with indigenous peoples with regard to their lands, territories, and resources, then stronger legally binding obligations are required.... This developing norm requires that consultations take place prior to both the exploration and exploitation of resources within the territories of indigenous peoples or that affect traditionally used resources. This means that consultation processes are not intended to simply take place when issuing an exploration or exploitation license, but at the moment a State is considering opening up an area to exploration and throughout the various stages of resource exploitation.... Even though it is not articulated as consent, the developing norm of consultation in good faith, if applied as a standard that requires States to consult with indigenous peoples in such a way that the goal is to reach an agreement or consensus, might well become a de facto obligation that ensures that indigenous peoples' FPIC is sought and respected”*.

The implementation of the FPIC was studied in detail concerning the indigenous people with respect to the extractive industries (Doyle & Carino, 2013, 2014). Although geothermal energy projects differ from those in the mining industry, there are a few common points of interest concerning this approach that is formally accepted by dominant mining groups but is shown to fail in its application due to numerous challenges underlined by the authors. These include: lack of access to information, lack of financial means for proper consultation, weakness of concerned communities, lack of state involvement in recognizing indigenous people's sovereignty, inequity of negotiations procedures with a lesser access to public authorities for indigenous communities than for the foreign mining companies.

With such a scenario, we remain in a situation in which proposed or implemented geothermal projects are handled by entities (whether national, regional or international) that local communities around geothermal sites cannot identify with, so seen at community level as being foreign. In such cases, it would be a good idea to highlight at community level that partnering with external developers is just but one among other options that could be consider. To respond to the current technical and social challenge posed by geothermal development in Eastern Africa, the approach that this paper recommends is the establishment of a process that lays emphasis on targeting respective local communities with early knowledge-sharing and awareness-creation of pertinent information related to the geothermal resources found on their land. As noticed above, they (local community) are the ones who best know their land, including thermal manifestations, whether permanent or temporary (for

example. historic phreatic explosions), and eventually developed traditional uses by surface capture of these resources. Engaged through various means, including, but not limited to: learning institutions-based education programs for the youth and for adults, this approach should enable members of target local communities to study the best options and engage in the valorisation of geothermal resources found on their land under their own initiative with the aim of answering their socio-economic needs, enhancing the local community's sustainable development.

In so doing, the local community members will get to a stage that requires they seek expert advice on the best options at their disposal as well as to be linked with potential developers. This encounter will facilitate a process where they narrow down to a form of project development that will answer both their needs as well as eventually serve the developer's and public interest at local and national levels. The entire process would therefore better prepare the local community to hold "win-win" negotiations with potential geothermal developers thus eliminate the latent conflict that has been present in the currently predominant approach that considers engaging local communities in discussion after major project decisions have already been made.

3. THE EXAMPLE OF MAORI TRUSTS' INVOLVMENT IN GEOTHERMAL DEVELOPMENT PROJECTS

3.1. The Karewau case in the Bay of Plenty, and the development of a Maori trust, NTGA

The case of Kawerau, in the Bay of Plenty was studied by Adlam and King (2015). Some of the highlights of their study corroborates with information obtained by the authors of this paper during the *Geothermal Policy and Implementation: The New Zealand Example* course summarized below.

The Treaty of Waitangi¹ (1840) signed between the British Crown and Maori Tribes of New Zealand marks an important part of their history. A period of "war" between the Crown and Maori started in 1863 in the Bay of Plenty (BoP) area. Crown officials were killed, which resulted in a Crown expedition of some 500 men in which Maori people were then also killed. As a result of this conflict, the Crown confiscated 87,000 acres of BoP land as a punishment for this "rebellion" against the Crown. In the 1890s civil works on wet zones for agricultural development purpose had significant adverse effects on thermal seepages, sacred places and areas for gathering food and other resources, impacting negatively on the relationship of Maori with the geothermal resource.

Geothermal resource were viewed by the Maori as a treasure (*taonga*) provided to them when they arrived in New Zealand in the 1300's. At the time, the Maori settled in the Kawerau area and would use geothermal for cooking, horticulture and warmth. In 1953 the New Zealand Government passed an Act of Parliament giving itself the sole right to tap and use geothermal energy. Since the early 1950s, geothermal energy was used for the processing of logs from the surrounding forests for wood drying and pulp production. In the late 1980s, through the Public Works Act, the Government initiated a programme of surface exploration and drilling to identify New Zealand's geothermal areas. The Kawerau area was shown to bear a liquid-dominated alkali-chloride geothermal reservoir, with deep thermal up-flow in the greywacke basement in the South and out-flow to the North and West. Chloride-bearing hot springs were found to emerge in numerous sites; the majority of which were on Maori-owned lands (Powell, 2011). This resulted in the construction of the Pulp and Paper Mill in Kawerau, as well as the Wairakei Geothermal Power Station in Taupo. Both were undertaken without the consultation of the Maori, and resulted in alienation of lands, the people losing control and access to geothermal resources, as well as pollution and degradation of the Tarawera River.

In 1988, The Waitangi Claim was engaged. The claim highlighted relate to breaches by the Crown of its obligations under the Treaty of Waitangi relating to the confiscation of most of the Maori people's

¹ This treaty provided that Maori were guaranteed a continued control and enjoyment over their land and could only sell them to the Crown. There continues to be difficulty in reconciling the English and Maori versions of the Treaty: The Maori believed they were simply giving the British Queen first offer on land, after which they could sell it. The English interpretation prevented the sale of Maori land to anyone other than the Crown.

land with inadequate compensation leading to alienation of remaining lands. The Claims Settlement Act states: “*The Crown acknowledges the statements made by BoP of their particular cultural, spiritual, historical and traditional association with, and use of, the geothermal energy and geothermal water located in the Kawerau Geothermal system... the origins of the geothermal energy and geothermal water... to their great ancestor*” who exercised authority in the area. The confiscation of land was considered “*unjust and a breach of the Treaty of Waitangi and its principles*”... in particular in failing to ensure the Maori were “*left with sufficient land for their present and future needs*”. The Deed of Settlement was thus considered as having terminated the 142 years period of war between the Crown and Maori (1863 – 2005) that started in BoP.

As a matter of fact, the use of the geothermal resource enabled people to live and thrive in the region since early times. Geothermal was used holistically, as a special place of healing and recuperation and for the early cultivation of plants, especially *kumara*. The steam was used for cooking and the warm water as breeding ground for eels and carp. The sulphur was used for medicine and the hot water for bathing.

The Settlement included a package of cultural, financial as well as commercial redress and enabled the Maori people of BoP to move forward, and to initiate ventures for future economic growth. The Bay of Plenty (BoP or *Ngati Tuwharetoa*) Settlement Trust (NTST), with 1.700 Maori beneficiaries, established a corporate structure to effectively manage its assets and operations (Fig. 5). NTST established its company, NTGA who in June 2005 purchased most of the Kawerau geothermal wells, pipelines, direct heat business, commercial supply contracts, resource consents and intellectual property, providing opportunities for social and economic development within the indigenous territory. NTGAs long term vision aligns with the guiding principles of the NTST Trust Deed, which requires the Trustees to “*be guided by the recognition of the need for the interests of the extended family (whanau) to nurture and grow assets for those that follow.*” Actions undertaken aim at ensuring that future generations are better positioned and prepared to build a sustainable future.

The business of NTGA is that of a wholesaler supplying geothermal energy to Kawerau industry, primarily for process heat and electricity generation, by establishing and maintaining infrastructure (wells, separators and pipelines) to enable the geothermal fluid to be delivered to customers for both heat consumption and electricity generation. This implies sophisticated distribution and control systems to accommodate the mix of constant and inconsistent demand by its users. Six (6) production wells and five (5) injection wells are presently in operation with associated infrastructure and computer control systems. Significant investment were engaged in the understanding of the field, including extensive scientific surveys, reservoir testing, production and reservoir modelling utilising a network of deep, shallow and ground-water monitoring wells. Results of the various monitoring are used for the reservoir management and subsidence models.

Geothermal fluid is used in multiple ways to maximise applications and meet customer requirements. NTGA has spent close to \$65M in new infrastructure to improve the reliability of its business, increase capacity and provide for new customers. An average 220tph steam is supplied to the pulp mill, made up of both low pressure and high pressure steam, whereas 25tph of the high pressure steam is passed on another client for use in their timber drying kilns. In 2010 a new system was designed to provide 26tph of clean steam replacing the steam from existing gas-fired boilers replacing natural gas. In 2013 a supply agreement was signed between NTGA to supply 114tph steam and 600tph separated water for a new 23MWe power plant called TOPP1. In 2014 a new contract was signed for the supply of up to 30tph raw geothermal steam for kiln drying. Pressurised separated hot water is supplied for electricity generation using a 1.5MWe binary plant which uses up to 280tph of water at about 180°C. Additionally, pressurised separated hot water is supplied to another 2.5MWe binary plant using 240tph of water at about 100°C. NTGA is also in dialogue with industry into additional cascade uses including glasshouses, waste disposal and wood drying for further uses.

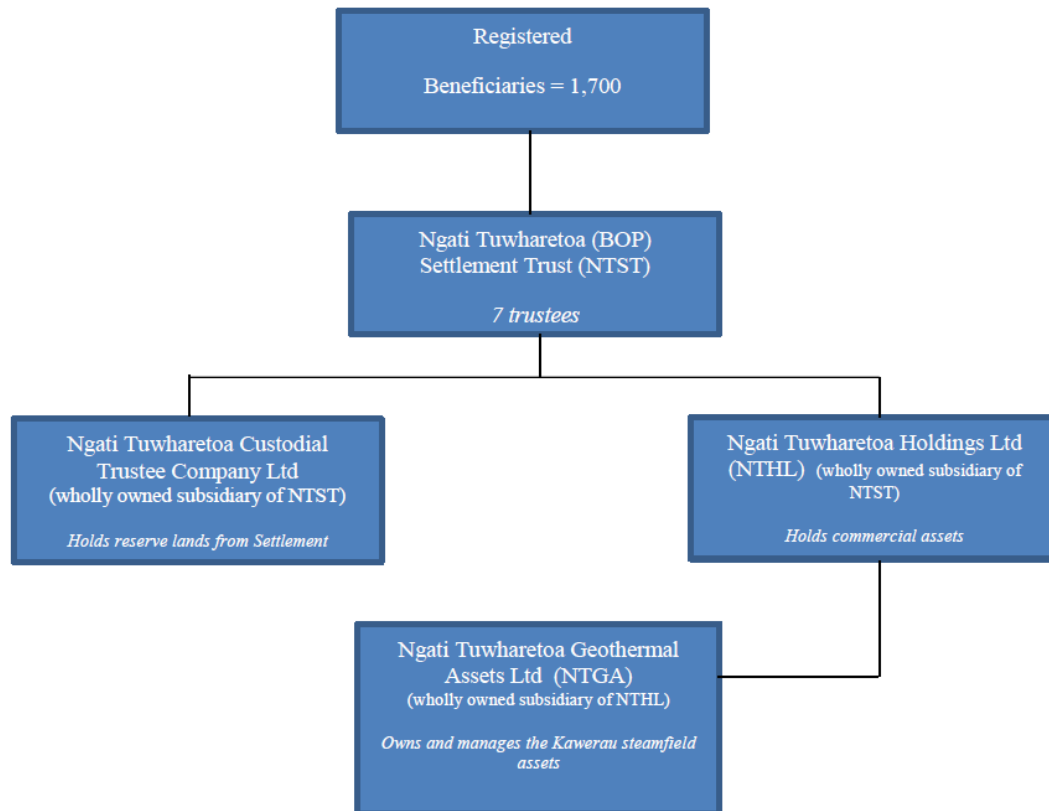


Figure 5: Relationship between beneficiaries, Settlement Trust and subsidiary companies holding land, commercial assets and the Kawerau geothermal field.

NTHL continues to actively seek opportunities to increase the returns from its land-holdings and to provide a long-term diversified income stream and significant amount of employment for the region. Economic aspirations are not separated from social aspirations, with engagement to enhance the skills and opportunities for Maori people to be involved in NTST's growing businesses.

In summary, after much effort through difficult socio-economic circumstances over a considerable period of time the Maori people in BoP finally succeeded in having a Settlement Act signed and initiated a process that has led to associate the indigenous Maori people to the management of the geothermal resource. NTGA has now the manpower and resources to operate the world's largest supplier of geothermal direct heat energy for industrial use. Operations of NTGA remains aligned with the values and guiding principles of NTST, achieving of a long-held desire by the Maori to promote sustainable economic development by and amongst its people.

3.2. The Maori Trust Groups for local applications of geothermal energy

As a result of these developments, several Maori Trust groups have been formed. As shown by Bradshaw & Faulkner (2011), five Maori Trust groups have to date acquired experience related to local applications of geothermal resources (Fig. 6). These Trust groups are:

- Pārahirahi C1 Trust (Northland)
- Ngāti Wai Trust Board- Ngāti Rēhua (Great Barrier)
- He Oranga mo Ngā Uri Tuku Iho Trust (East Coast)
- Whakarewarewa Village Charitable Trust (Rotorua, see Fig.7)
- Tahorākuri Section A1 30 Trust (Reporoa)

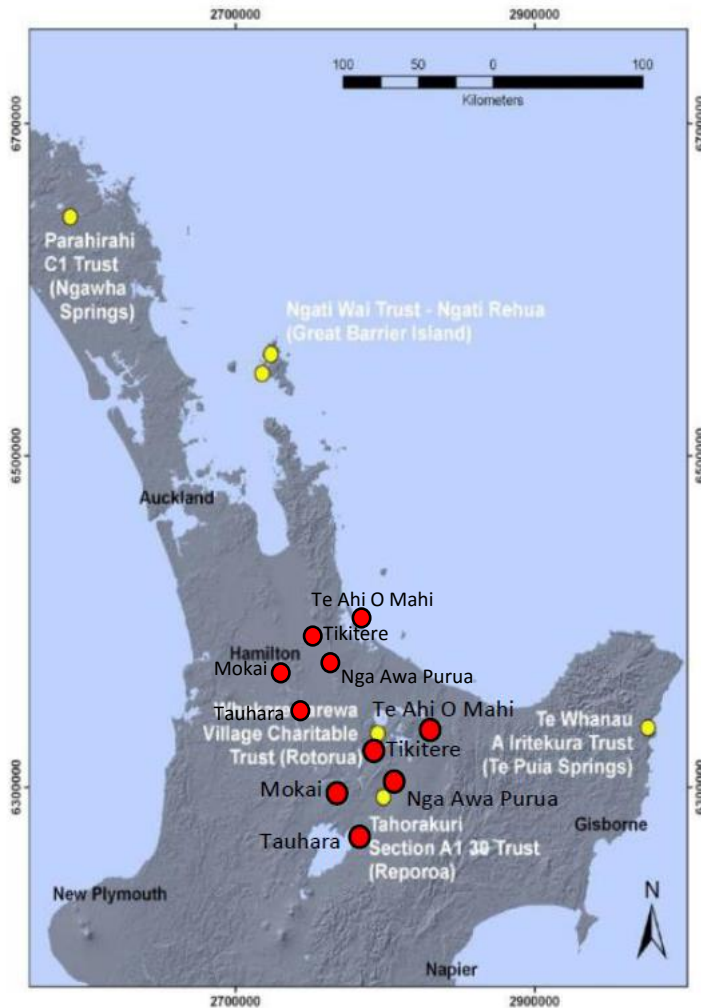


Fig. 6: Map showing the location of the Maori Trusts involved in geothermal project developments: direct uses (yellow dots) and electricity generation (red dots). Compiled from Bradshaw & D.Faulkner, 2011.

The case of Pārahirahi C1 Trust represent a good example of these indigenous socio-economic organisations. It is the governing body that manages the Ngāwhā Hot Spring Resort. The trustees represent 11 owners and beneficiaries (including their direct descendants) to the Trust. The Trust seeks that its environment and the historical values associated are protected and preserved for the benefit of the descendants of the original owners. The Trust's objectives are:

1. To promote the cultural and spiritual values associated with the site.
2. To ensure the site is protected and maintained to set standards.
3. To generate income for administration, up-keeping and development.
4. To generate income for the benefit of the beneficiaries.
5. To act collectively in promoting the site.
6. To liaise with other organisations for mutual benefits.
7. To keep beneficiaries informed of all activities.

3.3. Present situation of Maori Community-Owned Geothermal Power Plants

The formation of these trust groups has led to a situation where the Maori community owns several, among the most significant geothermal power plants of the country. A defining moment happened a few years ago, when the Maori “graduated” from “impacted population” to “acting agents of development”, with the engagement of several Maori Trusts in electric generation from geothermal power plants. At present, 5 geothermal plants operating or being commissioned are at least partly owned by Maori trusts:

- The 100MWe Kawerau Geothermal Power Plant with the Putauaki Trust (2008) described above. We have seen that it combines electricity production with direct use. This includes wood drying as well as a pulp and paper plant that benefits from a 10MW geothermal steam back-pressure from Kawerau geothermal site.
- The 114MWe installed Mokai Geothermal Power Plant, near the town of Taupo, with the Tuaropaki Trust (with a successive commission of Mokai 1, 2 & 3 in 1999, 2005 and 2007). Here again, the electricity production is coupled with direct use: a milk processing plant, with a capacity to process 1 million litres of milk /day since 2011. Energy used in the milk-drying process is delivered by the geothermal site, and up to 60GJ per/day of waste heat is recycled to further improve the energy efficiency of the plant and downstream uses (such as greenhouses).
- The 140MWe Nga Awa Purua Geothermal Power Plant with the Tauhara North N°2 Trust, representing 200 Maori owners.
- The 45MWe Tikitere Geothermal Plant with the Tikitere Trust to be commissioned in 2016.
- The Te Ahi O Mahi 20MWe with the Ahu Whenua Trust to be commissioned in 2017.

In the initial development of geothermal energy in New Zealand (Wairakei, 1958, the second geothermal plant in the world after Larderello, Italy), large-scale extraction of geothermal fluid locally depleted the reservoir and caused many hot pools to disappear. At present, developers must obtain resource consents prior to developing geothermal areas, under a process that requires consultation with local populations including the Maori and considers potential effects of fluid extraction on natural sites. In addition, binary plants have been developed, allowing for the total re-injection of the fluid in the reservoir, ensuring to maintain sustainable hydrogeological conditions in the site and surroundings. The strong implication of the indigenous population is an important factor of success of this economically and socially sustainable development that could inform the current geothermal development approach in Eastern Africa.



Fig.7: Visit of a traditional Maori geothermal village by the authors; one of the original housing (photo J.Varet).

4. RELATING U.N. RESOLUTIONS ON INDIGENOUS PEOPLE'S RIGHTS TO EARV PASTORALIST COMMUNITIES AND GEOTHERMAL ENERGY DEVELOPMENT

Despite their historical and traditional use of the outcropping part of geothermal resources, pastoralist communities along the EARV are not all aware of the high value of the geothermal- potential land they inhabit,. They are eventually even less aware of the fact that pastoralist communities are considered as indigenous people, and are therefore de-facto recognized worldwide as indigenous people. As such they benefit from specific rights, following the Resolution N°61/295 adopted by the General Assembly of the United Nation. Even though it may not be known by all concerned parties,

its implementation is backed by the Working Group on Indigenous Populations/Communities in Africa established by the African Commission on Human and Peoples' Rights of the African Union.

4.1. Resolution adopted by the General Assembly N°61/295. United Nations Declaration on the Rights of Indigenous Peoples

The Resolution States in the preamble:

- *Affirming that indigenous peoples are equal to all other peoples, while recognizing the right of all peoples to be different, to consider themselves different, and to be respected as such,*
- *Affirming also that all peoples contribute to the diversity and richness of civilisations and cultures, which constitute the common heritage of humankind,*
- *Affirming further that all doctrines, policies and practices based on or advocating superiority of peoples or individuals on the basis of national origin or racial, religious, ethnic or cultural differences are racist, scientifically false, legally invalid, morally condemnable and socially unjust,*
- *Reaffirming that indigenous peoples, in the exercise of their rights, should be free from discrimination of any kind,*
- *Concerned that indigenous peoples have suffered from historic injustices as a result of, inter alia, their colonisation and dispossession of their lands, territories and resources, thus preventing them from exercising, in particular, their right to development in accordance with their own needs and interests,*
- *Recognizing the urgent need to respect and promote the inherent rights of indigenous peoples which derive from their political, economic and social structures and from their cultures, spiritual traditions, histories and philosophies, especially their rights to their lands, territories and resources,*
- *Recognizing also the urgent need to respect and promote the rights of indigenous peoples affirmed in treaties, agreements and other constructive arrangements with States,*
- *Welcoming the fact that indigenous peoples are organizing themselves for political, economic, social and cultural enhancement and in order to bring to an end all forms of discrimination and oppression wherever they occur,*
- *Convinced that control by indigenous peoples over developments affecting them and their lands, territories and resources will enable them to maintain and strengthen their institutions, cultures and traditions, and to promote their development in accordance with their aspirations and needs,*
- *Recognizing that respect for indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment.*

Several other articles selected by the authors of this paper for their relevance to the arguments being advanced in this paper in relation to geothermal projects in the EARV are:

Article 18 Indigenous peoples have the right to participate in decision-making in matters which would affect their rights, through representatives chosen by themselves in accordance with their own procedures, as well as to maintain and develop their own indigenous decision-making institutions.

Article 19 States shall consult and cooperate in good faith with the indigenous peoples concerned through their own representative institutions in order to obtain their free, prior and informed consent before adopting and implementing legislative or administrative measures that may affect them.

Article 20 1. Indigenous peoples have the right to maintain and develop their political, economic and social systems or institutions, to be secure in the enjoyment of their own means of subsistence and development, and to engage freely in all their traditional and other economic activities. 2. Indigenous peoples deprived of their means of subsistence and development are entitled to just and fair redress.

Article 21 1. Indigenous peoples have the right, without discrimination, to the improvement of their economic and social conditions, including, inter alia, in the areas of education, employment, vocational training and retraining, housing, sanitation, health and social security. 2. States shall take effective measures and, where appropriate, special measures to ensure continuing improvement of their economic and social conditions. Particular attention shall be paid to the rights and special needs of indigenous elders, women, youth, children and persons with disabilities.

Article 26 1. Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired. 2. Indigenous peoples have the right to own, use, develop and control the lands, territories and resources that they possess by reason of traditional ownership or other traditional occupation or use, as well as those which they have otherwise acquired. 3. States shall give legal recognition and protection to these lands, territories and resources. Such recognition shall be conducted with due respect to the customs, traditions and land tenure systems of the indigenous peoples concerned.

Article 27 States shall establish and implement, in conjunction with indigenous peoples concerned, a fair, independent, impartial, open and transparent process, giving due recognition to indigenous peoples' laws, traditions, customs and land tenure systems, to recognize and adjudicate the rights of indigenous peoples pertaining to their lands, territories and resources, including those which were traditionally owned or otherwise occupied or used. Indigenous peoples shall have the right to participate in this process.

Article 28 1. Indigenous peoples have the right to redress, by means that can include restitution or, when this is not possible, just, fair and equitable compensation, for the lands, territories and resources which they have traditionally owned or otherwise occupied or used, and which have been confiscated, taken, occupied, used or damaged without their free, prior and informed consent. 2. Unless otherwise freely agreed upon by the peoples concerned, compensation shall take the form of lands, territories and resources equal in quality, size and legal status or of monetary compensation or other appropriate redress.

4.2. The Working Group on Indigenous Populations/Communities established by the African Commission

Historically indigenous people have always existed in Africa just like anywhere else in the world. However, during the colonial period the term was used to refer to the people that inhabited the continent when European colonialists came to conquer Africa. So, the term indigenous referred to native Africans as opposed to the new-comers or colonialists. After independence, therefore, the common stand that seemed to be taken by most African leaders was that once the Europeans are gone there was no need of the use of the term 'indigenous' as all native Africans are considered to be indigenous. Apparently this position was not a deliberate political strategy to suppress the interest and demands of indigenous people; rather it was a reflection of the general approach, perception or understanding of the general public and African decision-makers on the question of indigenous people in Africa.

It is against this backdrop that when the African Commission on Human and Peoples' Rights (of the African Commission) started functioning in 1987, the issue of indigenous people was far from being one of its priorities; and it had not been so for more than a decade. It was only in 1999 that the question of the rights of indigenous people appeared in the agenda of the African Commission. In the next four consecutive Sessions of the African Commission, Non-Governmental Organisations lobbied and brought to the attention of the African Commission the plight of indigenous people in the continent characterized by, among others, marginalisation, exploitation, dispossession, harassment, poverty and illiteracy.

This convinced the latter to adopt a resolution establishing a Working Group on Indigenous Populations/Communities in Africa under the African Commission on Human and Peoples' Rights

with the adoption of Resolution 51 at the 28th Ordinary Session (Cotonou, Benin - 23 Oct. to 6 Nov. 2000). The mandate calls for the Working Group to:

- “*examine the concept of indigenous people and communities in Africa;*
- *study the implication of the African Charter on Human and Peoples’ Rights and well-being of indigenous communities, especially with regard to:*
 - o *right to equality (Articles 2 and 3);*
 - o *right to dignity (Article 5);*
 - o *protection against domination (Article 19);*
 - o *self-determination (Article 20);*
 - o *promotion of cultural development and identity (Article 22).*
- *Consider appropriate recommendation for the monitoring and protection of the rights of indigenous communities”.*

The mandate has been renewed four times with the adoption of Resolution 81 at the 38th Ordinary Session, Resolution 123 at the 42nd Ordinary Session, Resolution 155 at the 46th Ordinary Session and Resolution 204 at the 50th Ordinary Session. Since 2005, the Working Group has held more than ten research and information visits to State Parties, with the general purpose to inquire into the status of indigenous peoples

In May 2001 during its 29th Ordinary Session, the African Commission established the anticipated Working Group of Experts comprised of three (3) Commissioners and three (3) experts from indigenous communities in Africa and one independent expert on indigenous issues. The Working Group implemented its mandate by producing a report titled *Report of the African Commission ’ s Working Group on Indigenous Populations / Communities*, which was adopted by the African Commission in November 2003. One of the recommendations of this report was the establishment of a full time Working Group on Indigenous Populations / Communities in Africa.

The Working Group was renewed with the following mandate:

- Raise funds for the Working Group’s activities, with support and cooperation of interested donors, institutions and NGOs;
- Gather information from all relevant sources (including governments, civil society, indigenous populations and their communities) on violations of human rights and fundamental freedoms of indigenous populations and communities;
- Undertake country visits to study the human rights situation of indigenous populations/communities;
- Formulate recommendations and proposals on appropriate measures and activities to prevent and remedy violations of the human rights and fundamental freedoms of indigenous populations/communities;
- Submit an activity report at every ordinary session of the African Commission;
- Cooperate when relevant and feasible with other international and regional human rights mechanisms, institutions and organisations.

CONCLUSION: FOR A NEW APPROACH TO GEOTHERMAL DEVELOPMENT IN EARV

The African Rift Valley, particularly the Eastern branch that extends from Eritrea and Djibouti to the north; to Tanzania to the south; through Ethiopia and Kenya, has a specific geology which, coupled with the active rift system, makes it possible to develop geothermal resources of exceptional quality for a large variety of uses including electricity production. It however happens that these geographic areas are also dry, if not arid and are predominantly inhabited by indigenous pastoralist communities; who have adapted to this kind of environment and developed sustainable practices that enable them to adjust to the climatic variations. These pastoralist communities have largely taken up transhumance as an efficient adaptive technique for dry African climates and related ecosystem maintenance. As mobile indigenous herders, they have also developed their own practices and traditional governance institutions. Even though, this is not reflected in land tenure laws, which are for the most part based on colonial legislation and norms.

Lacking vital information on the geothermal resources that characterize their land, the pastoralist communities that live along the EARV are equally unaware of their rights as indigenous people as stipulated by international institutions (particularly the United Nation and the African Commission). Added to these challenges is the question of the mere recognition of the existence of indigenous people (Bellier, 2016).

There is a wide gap between the urgency at times exhibited by professional institutions who have financial resources as well as ready and advanced expertise to develop geothermal resources vis-à-vis the status on the same of the local communities on the respective sites. However, it is still imperative, to engage a process of change for a new approach to geothermal development that would be inclusive, rather than exclusive of these indigenous people. The Maori example show the place taken by the compensation obtained after the authority recognized land dispossession, allowing them to invest in geothermal. Is this issue really specific to New Zealand?

At present, local communities living around geothermal-potential areas already possess a good amount of indigenous knowledge related to these resources. There is however need to enhance this knowledge to a level where among other issues, these communities get to understand their rights, how adapted technologies can be used to answer their socio-economic needs and help them in their efforts towards resilience against climate change. Such a situation would enable them to participate in decision-making processes related to geothermal energy development as equal partners to developers and other stakeholders; regardless of whether it is large or small size projects.

Through a 3-year research programme (GeoPower Africa) financed by United States Agency for International Development (USAID) and covering Ethiopia, Kenya and Tanzania, a first step of knowledge-sharing and awareness-raising through dialogue with target local communities have been engaged. An emphasis on a gender-perspective guides the consultative community meetings. The local communities with whom these initial consultations have been held have demonstrated a high level of interest for local geothermal projects that would tap into the resources with the aim of responding to the communities' socio-economic needs (see Mariita et al., this volume). On the other hand, a longer history between one of the authors of this papers (J. Varet) and the Afar communities of NE Ethiopia, local community mobilisation is at a more advanced level and has reached the stage of establishing a Geothermal Development company fully owned and administered by Afar representatives of 13 localities and sub-communities (see Nebro et al. this volume).

As geothermal energy development takes centre stage along the EARV, it is important that the examples of the Maori Trusts; where an approach to geothermal development that facilitates local communities' ownership of geothermal plants and socio-economic gain, is highlighted among geothermal stakeholders in Eastern Africa. The Maori are now one of New Zealand's key players in geothermal development projects. Just like some of the indigenous people along the EARV, they have had a long history of artisanal use of geothermal resources on their land, land dispossession and attempts to have issues related to their rights in this regard attended to. Obviously, there are lessons for geothermal energy development stakeholders to learn from the Maori experience in the EARV context.

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