Enshrining Indigenous Knowledge in the National Science Curriculum: Issues Arising from the Maori Case

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RCSD Conference - Chiang Mai University

Politics of the Commons:

Articulating Development and Strengthening Local Practices

July, 11-14 2003

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> *Only where cultural diversity has been able to persist does biodiversity continue to exist; it can be found in the few niches that have not yet been completely modeled after the Western pattern and its mechanistic metaphor*. ~Vandana Shiva

Introduction

In his paper presented to the World Intellectual Property Organization, Mugabe (1998) has explained that there is great debate as to whether to pursue international legal measures to extend intellectual property rights to cover indigenous/traditional knowledge or to treat indigenous knowledge as a public good. He has further clearly delineated the problems associated with intellectual property law – "established and enforced on the basis of Western capitalistic models" and that "traditional knowledge fails the test for patenting" because it cannot prove it involves an inventive step or is capable of industrial application. There are many counter appeals to these notions, but the fact remains that "conventional intellectual property law does not cover inventions and innovations of indigenous and local peoples." He grimly concludes that, although the international community has recognized a need to expand protection to accommodate indigenous/traditional knowledge, there are "no coherent and inclusive international efforts… made at addressing the concern."

Since Mugabe presented his paper, there have been efforts to promote the rights of indigenous peoples and their knowledge, but the results in the form of benefits and protection have been meager. Some of these are presented later in this paper, and although they promise some hope, the general state of the world and the global ruling elites who seem to exercise limitless power with impunity do not offer respite for the conditions of the poor or the powerless. Given that the choice for protecting indigenous knowledge appears to be divided between protracted legal advocacies or protecting knowledge through establishing them as investments in public goods, we believe that investing them as public goods is a potentially more dynamic strategy. Indigenous knowledge as a public good seems more coherent and compatible with the idea that indigenous knowledge represents community property, is holistic, and is passed on in a cultural context from one generation to the next. The new paradigms in education emphasize localism and globalism make the enshrinement of indigenous knowledge into the national curricula an ideal situation from which to begin developing the necessary social, cultural, and educational capital necessary to become an equal participant in the global community. It offers the immediate springboard to establish incentive for indigenous people to be productive citizens bringing wealth to a nation, a region, a planet destabilized by inequality.

PART I: Defining Indigenous Peoples, Defining the Maori

The United Nations and Indigenous Peoples

The UN Leaflet #10 (OHCHR, 2001) states "there are an estimated 300 million indigenous people in more than 70 countries worldwide… Indigenous peoples account for most of the world's cultural diversity… Of the estimated 6,000 cultures in the world, between 4,000 and 5,000 are indigenous. Approximately three-quarters of the world's 6,000 languages are spoken by indigenous peoples." Further, the World Wildlife Fund (WWF) has reported "4,635 ethno-linguistic groups, or 67 per cent of the total number of such groups, live in 225 regions of the highest biological importance." (Larsen, P., Oviedo, G., & Maffi, L., 2000) The WWF is concerned that, since a vast amount of the world's ecological knowledge is stored in the IP languages that are rapidly disappearing, and "since in most traditional cultures this knowledge is

passed on to other groups or new generations orally, language extinction is leading to loss of ecological knowledge." (Larsen, P., Oviedo, G., & Maffi, L., 2000)

Languages, indicators of cultural diversity, represent the repository of "peoples' intellectual heritages and frameworks for each society's unique understanding of life…" (UN Leaflet #10, OHCHR, 2001) The rapid rate of extinction of language – about 600 languages in 100 years with another 2500 on the verge of dying - threaten to erase the world's cultural diversity and what's worse, many languages are losing the "ecological contexts" that allow them to be "living" languages. The UN projects that 90% of languages, most of them spoken by IP, will be lost this century along with the local ecological knowledge (UN Leaflet #10, OHCHR, 2001). UN has described the undeniable association between IP and biological and cultural diversity in this manner:

> Indigenous peoples inhabit many of the areas of highest biological diversity on the planet. When looking at the global distribution of indigenous peoples, there is a marked correlation between areas of high biological diversity and areas of high cultural diversity. Of the nine countries in which 60 per cent of human languages are spoken, six also host exceptional numbers of plant and animal species unique to those locations (UN Leaflet #10, OHCHR, 2001).

The UN contends that there is a strong relationship between the conservation of biological diversity and the maintenance of cultural diversity, and this in turn is related to long-term food and medicinal security. Cultural diversity is as essential as the evolution of civilization, just as the biodiversity is for biological evolution. Human survival is threatened as much by unsustainable ecological practices as by the swallowing of diverse cultures. The relationship between the survival of IP and the environment is founded upon the belief that the environment is an embodiment of the people's IK – spiritually, culturally, and socially. IP generally find it a duty to steward the land with the same regard as the care given to family and tribe. The land and tribe arise together from the same origins through revered ancestors to a fecund future stewarded by the children of a future relative.

There are a number of organizations under the United Nations umbrella that are working with indigenous peoples, including: ILO, UNDP, UNESCO, WIDO, and the UNHRO. In addition, IP worldwide have formed sixteen representative organizations that have "consultative status with the UN Economic and Social Council" (UN Leaflet #1, OHCHR, 2001). This status entitles the representative organizations to attend and participate in international and intergovernmental conferences. There are additional representative groups and organizations that participate in various UN meetings. A recent and significant development to expand the role of Indigenous People representation occurred in 2000 with the establishment of an advisory board, Permanent Forum on Indigenous Issues. The Forum is composed of sixteen experts – eight proposed by Indigenous People – and reports to the Economic and Social Council.

Another significant agency is the UNHRO. It is significant in that, under its auspices, the *Working Group on Indigenous Populations*, one of the largest UN forums in the human rights field, was formed as a subsidiary organ of the Sub-Commission on Prevention of Discrimination and Protection of Minorities. The Working Group is composed of five members - one from each geopolitical region of the world – are members of the Sub-Commission and act as independent experts. The Group meets annually for one week and seeks to bring together governments and IP for the purpose of exploring mutual interests. The Group has the dual function of reviewing the progress in the "promotion and protection of the human rights and fundamental freedoms of indigenous peoples" (Fact Sheet No. 9 (Rev.1), UNHCHR, 1997) and "to develop international

standards" appropriate to a wide context of indigenous conditions and contexts.

A consortium of organizations that includes the UNDP, the International Development Research Centre, and the Swiss Development Cooperation, has given support to the Indigenous Peoples' Biodiversity Network. The Network has put forth an initiative, The Indigenous Knowledge Programme (IKP), which has been designed to promote indigenous knowledge (IK) globally. The IKP's Steering Committee is composed of a General Coordinator and eight Regional Coordinators representing Indigenous People organizations and has three primary goals:

- "to promote the participation of IPOs in international processes and conferences of concern to indigenous peoples, such as the annual Conference of the Parties of the Biodiversity Convention;
- to promote and conserve indigenous knowledge through, for example, research projects designed and implemented by IPOs in areas such as customary laws and traditional resource rights; and
- to allocate funding for indigenous peoples' self-help initiatives that address poverty reduction, human resource development and organization-building at the community level" (UN Leaflet No. 11, OHCHR, 2001).

The work of the Program has been evaluated positively in its efforts to recover and develop IK in order to conserve the ecosystems and biodiversity of forests. Its efforts are to create a sustainable development model based on traditional IK (UN Leaflet No. 11, OHCHR, 2001).

The World Intellectual Property Organization (WIPO) is a UN agency specifically devoted to the protection of intellectual property, including IK. WIPO has the capacity to provide technical advice and assistance to, mostly, developing countries striving to protect their intellectual property. Governments can also request advice in pursuing legislative action related to intellectual property rights.

Indigenous peoples are ever more vigilant in seeking to protect their traditional science and indigenous technology from being exploited by larger commercial interests. There are numerous cases of transnational pharmaceutical companies patenting, or laying claim to, even misappropriating, medicinal plants used traditionally by Indigenous People for many generations. Indigenous People usually do not have the theoretical conception of "owning" elements of nature, and likewise, companies do not realize that they are depriving Indigenous People of economic and traditional benefits of their IK. It is ever more essential that governments begin to adopt legislation that secures protection of IK within their borders. This is seen not only as a means of protecting Indigenous People, their cultural heritage and their traditional knowledge and practices, but the national interests of unity and prosperity, too. (UN Leaflet No. 12, OHCHR, 2001).

The Convention on Biological Diversity

Indigenous peoples usually take treaties, due to their significant symbolic value in promising recognition of sovereign rights and self-determination, quite seriously. It has been unfortunate that historically governments have not always held treaties in such high regard. The UNEP's Convention on Biological Diversity (CBD) is an international treaty and a legally binding instrument that advances policy that grants international cooperation in managing and conserving the world's biological resources. The treaty's provisions "calls for parties to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities relevant to the conservation and sustainable use of biodiversity, subject to national legislation" (UN Leaflet No. 10, OHCHR, 2001). Article 8(j) is regarded as the core provision of the Convention and it is of special importance to indigenous peoples because it asks for parties

to consider wider applications of biological knowledge and to gain both approval and involvement of the indigenous populations concerned. A key feature is that this provision also requires that all benefits arising from the application of IK should be shared equitably with the relevant indigenous peoples involved. This treaty, if enforced properly, ensures a more holistic approach to the sustainable use of biological resources and a more just approach to the appropriation of indigenous peoples' science and technology.

The Issue of Maori Identity

The relationship between Maori identity and indigenous identity are integral in deciphering a coherent policy related to indigenous knowledge. But, determining Maori identity has been New Zealand and it is no coincidence that it has been equally hard to get an accurate Maori population count. Edward Douglas, a demographer from the University of Waikato, calculates that the Maori population is 23% of the total population, while the New Zealand Planning Council calculates that it is only 8.9%. The Planning Council believes that population trends in New Zealand are declining, while Douglas has used 1981 census figures and other statistics to calculate that in 15 years time, 25% of all children leaving school will be Maori and 50% of the population living north of Lake Taupo will be Maori. Douglas has further calculated that in another generation, 30% of the total population will be Maori. He further speculates that in another generation, if intermarriages continue at the current level, the Maori population may exceed and be the majority group in New Zealand. (Moeke-Pickering, 1996)

The question remains about how to determine Maori identity. For a long time, a Maori was determined by blood quantum – specifically under the Maori Affairs Act of 1953, "a Maori was a person who was a half-blood or more, i.e., at least one of his parents was a full-blooded Maori, or both were three-quarter Maori or some similar combination." (Moeke-Pickering, 1996) Eventually, the definition was enlarged to include any person of Maori descent, many previously excluded by the "half-blood or more" quantum. The lesson learned was that cultural identities cannot be determined biologically and that the blood quantum idea served to weaken Maori identity. Implications of this blood categorization, coupled with the imposition of census and legal identity served to 'racialize' being a Maori, establishing a dominant non-Maori culture, and limited the options of identity to the Maori.

The shaping of Maori identity is still in process. Maori identity is not now determined by blood quantum; instead, identity is more closely associated with the relations one has in society and the fidelity to observance of Maori cultural customs and rites. Traditionally, Maori identity was derived from membership within the tribal structures: whanau, hapu, iwi and waka. The responsibilities to each of these structures were defined by genealogical ties and allowed the individual to feel a sense of belonging. Kinship duties within the tribal structures along with cultural practices, i.e., traditions, customs, and language, formed and bonded Maori identity in a place. Place – most often an actual location – represented an ancestral place, a tribal location with significant landmarks - mountains and rivers (Moeke-Pickering, 1996). The land was imbued with meaning for the Maori, a spiritual association that reflected Maori knowledge and devotion to land stewardship. The spiritual meaning of IK is associated with the intertwining of the boundaries of land, tribe, and self. It is understandable what effect the competition for land had on Maori identity as the dispersal of land became equal to the disassociation of tribes from their ancestral origins. Loss of land, eventually up to 95%, was equivalent to the psychological alienation from identity, much like amnesia due to trauma.

Many European descendent New Zealanders believe that if a Maori has any European blood in them, then they are European. The Maori believe the opposite - if someone has a Maori ancestor, even three or four generations back, then that person is a Maori. A Maori is one who

has Maori ancestry and who feels to be Maori. A concurring view is expressed in the Maori Affairs Act, the Treaty of Waitangi Act, the Electoral Act and many other statutes - any person who is descended from a Maori has the right to choose whether they will be regarded as Maori or not. This is a significant definition when considering the choices for future generations. For example, if a marriage between a Maori and a non-Maori bears four children, statistically, there are five Maori in this family. Or there could be a number of combinations, i.e., five non-Maori/one Maori, based on the choice of the individuals.

It is quite likely that more people will choose Maori ancestry and some will see it as an opportunity because Maori people currently enjoy a number of advantages and have a number of privileges that non-Maori do not possess. Realistically, more people are claiming their Maori ancestry, not as opportunists, but as people feeling as if they are forced to learn a foreign language, English, and being failed by an educational system that serves to both assimilate and alienate with equal dispassion. It is not a far reach to understand how attractive the concept of Whanau, birth, becomes for the majority of Maori who have experienced the dissonance of the educational system. It is also not too far of a reach to see how, after “birth”, identity and place become issues of deep concern.

PART II: Defining Indigenous Knowledge

Although the root of indigenous means something originating in a particular place with context; innate, or inborn (Merriam Webster, 1994), when we speak of *indigenous knowledge,* meanings and terminologies become quite varied. Interpretations are not usually stripped from a socio-political context. It is a rare occurrence to encounter the phrase in a neutral context, or at least one in which there are not controversies associated with multiple issues related to the comparison between civilized development and the familiar lore found in the complexity of human settlement.

Part of the reason for Indigenous knowledge’s (IK) variegated meanings can be understood by examining how it is embedded in the cultural fabric woven with the social, economic, technological, and scientific threads of a people developed and refined over time. Some reasons for controversy surrounding IK is due to an initial uninvited intervention of a civilization procession by those not indigenous and the resulting divergence that surrounds issues relating to power, identity, self-determination, economics, law and governance, responsible engagement, and human rights. The context of the relationship between the contenders determines the meaning and its reference. Ellen and Harris (2000) have catalogued some of the names for IK. They are reflective of some of the symbolic relationships IK has in different parts of the world: “indigenous technical knowledge”, “ethno-ecology”, “local knowledge”, “folk knowledge”, “traditional knowledge”, “traditional environmental (or ecological) knowledge”, “people’s science”, “rural people’s knowledge”.

It is assumed that IK must be the product of indigenous people (IP). Although this is the case in many instances, IK is not confined to original inhabitants of a land or to rural or forest peoples either. Any community can produce IK whether they are rural or urban, original or immigrant. Another assumption is that IK contradicts Western knowledge and the formal scientific approach. There are some differences in basic assumptions between the two types knowledge, but there is certainly overlap between the two and there are many examples of the synthesis of the two. IK has features and characteristics that allows for adaptation and appropriation, making some IK indistinguishable from western knowledge. Hunt and Harris (2000) have delineated characteristics of IK:

1. Local – embedded in a particular place within an experiential context that has been cultivated and transformed by people in that place. The risk of transferring that knowledge to other places might 'dislocate' it, making it ineffective in another context.
2. Orally transmitted – passed on through repetition, demonstration, and imitation. The risk of writing oral knowledge down is that it changes some of its basic characteristics and, even though it is more convenient and enduring, making it susceptible to 'dislocation'.
3. A result of interactions in everyday life, including intentional testing and modification. It becomes a product of reasoning and verification, much the same as any good science.
4. Has no organized theoretical framework – it is a way of life. It is imbedded in the memory of individuals in a socio-cultural context, represented by numerous mundane technical practices.
5. Redundant in order to serve retention – tradition is defined through repeated refinement.
6. Constantly changing – created, discarded, and recovered – it is dynamic, not static.
7. Shared throughout the community, more so than other forms of knowledge and science, hence the name 'people's science.' The dynamic feature of IK is that, through community distribution, it resides in the memory of different people in multiple forms.
8. Integrated holistically into practical cultural traditions with the distinction between rational and non-rational, technical from non-technical difficult to distinguish.

There is a danger in measuring the value of IK from a western science point of view. Hoppers has portrayed western science in a harsh, but revealing light when she says,

> Western science does not reflect the diversity and plurality of the world, and its proponents, favor Cartesian reductionism in which objects of study are arbitrarily isolated from their natural surroundings and relationship with fellows, reflecting a political choice with the objective to control nature and to exclude other ways of knowing (1999).

Hoppers also draws our attention to how modern western science displays attitudes associated with colonialism in that it tends to subjugate local culture by patronizing locals and their different processes of extracting knowledge from the local environment. Generally, modern science considers illiteracy to be ignorance and oral traditions and local beliefs to be primitive, superstitious, and inferior pseudo-science. Another caution for examining IK from a western point of view is that there is a tendency for the western view to take on a 'superior' trait that allows the user to make judgments about the level of development and needs for the local peoples, discouraging local decision-making and defining the parameters of reality and identity.

IK not only has defining characteristics, but there are a variety of types beyond the predictable categories of technology and practices. The International Institute of Rural Reconstruction (IIRR, 1996) has developed a list of typical IK categories:

- *Information* (Regional companion planting schemes; indicator plants; meteorological signals, etc.).
- *Technologies and practices* (Astronomy and astrology; Bone-setting methods; Disease treatments.)
- *Beliefs* (Beliefs are mainstays of culture, identity, livelihoods, maintaining health, and interacting with the environment.)
- *Tools* (Looms; cooking implements.)
- *Materials* (Preservation materials, textile dyes; craft materials.)
- *Experimentation* (Growing new species; trial integration of aquaculture; healers' tests of new plant medicines.)
- *Biological resources* (Animal breeds; Local crop and tree species.)

- *Human resources* (Specialists, seers and monks; kinship groups, councils of elders, or labor exchange groups.)
- *Education* (Traditional instructional methods; apprenticeships; observing and doing.)
- *Communication* (Stories impregnated or carved into stone or natural materials, folk media; traditional information exchange mechanisms.)

Where is IK found and how are local systems where IK resides identifiable? As mentioned previously, the characteristics of IK are usually closely related to place. Place in this regard is often referred to as 'local' and the people are generally referred to as 'locals'. What then are the characteristics of local systems where IK resides? The IIRR (1996) has defined them in this manner:

- *The majority of locals are generalists*
  Locals tend to know a little about many things whereas, in contrast, academia tends to know a great deal about a few things.
- *Holistic approaches*
  Local people may approach problems in an integrated, holistic fashion where one set of perceptions from one knowledge base affects how they attempt to solve problems. In other words, to an outsider, the relationship between the reasoning process and the application is a bit mysterious.
- *Integration of culture and religion*
  Religion and spirituality are integral components of IK and the relationship with technical knowledge is sometimes indiscernible. The acceptance or rejection of practices can be related to how deeply embedded the practice is or could be in a belief or spiritual practice.
- *Risk minimization as opposed to maximizing profit*
  Like the environment, the risk of losing resources is a far greater danger than the promise of reaping a large harvest. Large harvests and big profits are short-term benefits that often cost in the long run. Knowledgeable locals know this maxim well. This aspect of IK gives humankind insights on how communities have interacted with their changing environment and acted responsibly as stewards.

PART III: The Conflicts of Schooling for Indigenous Peoples

Social theorists during the 50s and 60s believed that state education applied in "Third World" countries was a means into transforming traditional peasants into modern people. Through this transformation, peasants cum people would become "economic people" engaging in productive activities that would automatically raise the GNP of the countries (Keyes, 1983). As it turns out, it didn't quite work this way, especially without the incentives to believe in utility theory, and particularly when the market was not driven by indigenous people's demand, but by their potential to be exploited or marginalized by the state, and now by global forces.

The International Labor Organization (ILO, 2002) claims that economic growth and social development of countries are invariably associated with large and sustained investments in education and training. Learning, education, and training offer benefit to individuals and society alike, but Individuals benefit only when they are supported by economic and social policies. Individuals who are well supported in such a manner have the opportunity to become socially mobile and are provided with choice in selecting career paths. These paths are escapes from poverty, marginalization, and encourage a productive life. For rural agriculturists, skills and knowledge raise outputs, efficiency, and income. According to the World Bank, primary education is the single largest contributor to growth and development in developing countries. A farmer with four years' schooling is much more productive than one who has no education.

Many in the development field also believe that improving girl's and women's access to education will reduce poverty significantly.

But in this world of globalization, how has education and learning changed and are ILO's claims accurate given the trend of education to indigenous people? Is it a matter of tossing money at the problem, or reallocating resources, or are there other less costly possibilities? For Most-Developed countries in the North, the trend is to place more cost onto students, orienting them to consumerism, inculcating students with the notion of schooling as an "investment" not an exploration, and convincing them that the labor market requires an over abundance of education to be employable in a market with limited opportunities with declining salaries. Significantly, over the last two decades, "school teachers were encouraged and trained to see themselves as managers, and to reframe the problems of education as exercises in delivering the right outcomes" (Smith, 2002).

There is an apparent discordance when states apply business models to national education systems. It has invariably led to a sorting and screening mechanism that prepares students for nothing less than social and ideological reproduction. This sorting out is a big enterprise in many nations with money passing many hands and a heavy investment by parents in performing appropriate socio-influential activities to ensure their child's secure place in society. This "competitive injustice" drains personal and national resources, yet does not, for the most part, prepare society for technological innovations or the development of individual's or the nation's comparative advantage. The filtering devices used to perpetrate this system are costly to a nation and particularly exclude indigenous and rural people, maintaining a continual cycle of diminishing returns. In essence, this sort of educational system has a very low production function, a low return of satisfaction to scholars and teachers, and few social externalities. The emphasis is less on community and equity, and rather more on individual advancement and the need to satisfy investors and influential consumers. Smith (2002) has his fingers on the pulse of education when he says, "Education has come to resemble a private, rather than public good." This is further reflected in many state's centralized control of the drive for assessment, achievement, deliverables, and standardization of curricula.

The "commodification" of education exemplifies the alienation process that results in more unexpected outcomes of education than anticipated. Schooling usually has as a goal of creating a national trust and commonality, a shared history and horizon. Schools are meant to be equalizing institutions that provide the means for a good life. However, Uthai Dulyakasem (1983) does not believe that state schools create a sense of national unity among heterogeneous groupings in a society. Dulyakasem believes that schools may increase ethnic friction, particularly at tertiary levels since modern concepts introduce economic competition, thereby highlighting scarcity of goods, high-level positions, and competition for these commodities. Ethnicity and class become factors as competition heats up. The education that unites minority people with the dominant culture also helps produce tension and identity distinction. These are some of the unexpected outcomes of education, in addition to resistance and the use of ethnicity as the basis for political mobilization.

The Difficulties of Education for Indigenous Peoples

Indigenous people generally are representative of the diverse ethnic minority groups found around the world. The Asian Development Bank (1999) has described ethnic minoritities as "those with a social or cultural identity distinct from the dominant or mainstream society, which makes them vulnerable to being disadvantaged in the process of development." Ethnic minorities live in relative cultural isolation with distinct linguistic and cultural backgrounds, and lack a sense of national identity. Minority populations are among the most disadvantaged and

vulnerable groups in society and usually face long-standing issues of citizenship, land use, and ownership. The encroachment of modern society and globalization into indigenous societies has disrupted worlds that were once suitably balanced for their people. Modernity has created an interface with the indigenous societies, requiring interaction, but in an unbalanced measure. The indigenous peoples have been directed to adapt to a foreign world with foreign customs, but not provided the necessary understanding or resources to make the interface a mutually rewarding one.

Indigenous people are expected to be educated in the dominant culture's necessary skill sets, yet face educational difficulties that are not common to the general population. Most usually, ethnic minorities suffer from a complex series of inextricably related issues beyond the expected cultural, lingual, and social differences, including: education, health, gender, empowerment, access to state goods/social services, migration and land use, and environmental issues. Minorities that suffer from severe health and nutritional problems are usually limited in educational opportunities, due to the lack of strength needed beyond daily survival activities to attend classes and study. Much like a dog chasing its tail, opportunities to learn new health practices and livelihood are diminished. In addition, minorities have limited political and social empowerment, which restricts abilities to influence policies, programs, interventions, and resource allocation for social services. Needless to say, minorities most often live marginal lives with poor standards of living and quality of life.

The Case of Thailand

In the case of Thailand, the gross and net enrollments are high among ethnic minorities, but there are high dropout rates. Upper primary grades have low enrollment and large drop-off, while there are very few ethnic minorities in secondary education. Teacher quality is low due to the difficulty in recruiting teachers, especially when considering that the salaries are low (slow to pay, too), few incentives, rough and dismal living conditions (usually minority community is a foreign culture to teachers who are sent by the state), high turnover rate, high student & teacher absenteeism, etc. To match supply with demand is extremely difficult and the low academic achievement of the minorities doesn't provide a pool from which to select educators. Although the literacy rate is high, oral and numerical literacy in the Thai national language is low. The national language is a foreign language and takes at least four years of "catch-up" to be proficient enough to function in school. Although educational rates have increased, the literacy rate has not with the lack of media limiting reinforcement of literacy application. Gender gap in literacy is high and evidence suggests that the higher the geographic elevation, the less access girls and women have to education. Most importantly, the school system failed because rural and village children were not prepared to be competent agriculturists in their local community.

Producing the new breed of farmers necessary to compete in the modern world may prove to be a worthy task, because the village and rural schools don't provide technical knowledge as much as they reproduce class relations and represent the state's efforts to modernize and integrate the rural and indigenous populations. The state also wants to foster the belief that the more schooling children have, the more opportunity one has to break free from the difficult life of farming. The reality for most students is that they will not go on to higher education and even if they do, there are few positions available after graduation. In other words, there is no real incentive to go to school or leave the community. Most educators in rural Thailand would agree that the goals of education are to produce a Thai citizen that speaks central Thai dialect, possess basic math and literacy skills, is loyal to the nation, is an obedient and humble loyalist, and be a decent, economically productive and lawful citizen. But, most critically, they are not educated to be good farmers with social status, opportunities for quality off-farm employment, and equipped with new modern technology. It is unfortunate since technology could really drive

the development of rural and village communities and provide the nation with more than mere human capital slaving in urban factories, while their family at home struggles to keep the farm afloat.

The Case of the Maori

As recent as fifteen years ago, 60 to 65% of Maori were leaving formal school settings and faced an unforgiving job market without benefit of credentials or skills. The government of New Zealand has been committed to providing educational opportunities for the Maori, but there have been indications that the structure, administration, delivery, and content are culturally non-adaptive in the Maori community and place the Maori at a disadvantage. Changes have been implemented, but the majority of Maori remain under pressure in the national school system. An important recent development has been the growth of Maori education, stimulating a demand for Maori language and culture in the national education system. This has allowed Maori peoples the opportunity to design relevant education programs that fit the needs of children and adults and has resulted in larger enrollment in bilingual and Maori immersion language classes in the national system. It is also a very controversial issue due to the fact that the non-Maori population contends that the teaching of Maori language and culture has no place in the public education system and infringes on democratic principles. This issue pits the rights of the cultural "majority" against the *principle of indigeneity*, the internationally recognized rights of indigenous people. (Durie, 2001) This issue remains to be resolved with and will rely on the integrity of the interpretation of the *Treaty of Waitangi* and the application of just and visionary policies to reconcile and enhance the rights and opportunities of a diverse, yet unified nation.

Efforts to improve Maori educational achievement have progressed somewhat, but there is still concern that Maori children are not keeping pace with other children. The Maori language immersion education has brought optimism and is now a three-pronged strategy aiming to revive Maori as a living language, involve Maori parents in the educational process, and examine possible hybrids of mainstream education and alternative approaches to satisfy Maori educational needs, including the encouragement of *iwi* (tribes) to develop education plans. There are signs that a segregated educational system may be preferable to many in New Zealand. In a five-year span from 1991 to 1996, Maori language early childhood education has increased by nearly 40% and Maori language medium education has also shown rapid expansion. Traditional Maori schools, *kura kaupapa*, have increased during the last decade from six to sixty. (IBE – UNESCO, 2001)

How will the nation see its educational system function to provide for both indigenous and non-indigenous peoples? Integrated action, as defined by Durie (2001), acknowledges the multiple layers of an educational system and integrates systematic, social, and familial forces to operate across multiple sectors and fields. Durie (2001) realizes that the lives of people in a nation as small as New Zealand are interconnected and that unless there is integrated action amongst the various characters in society, it will produce uneven progress resulting in partial development. He would suggest that natural linkages between school and community, teachers and parents, students and peers, and Maori and the state should be the starting point of integrated action. Social obstructions that inhibit integrated action, i.e., the violent effects of poverty and identity, are also in need of state and community attention if education is expected to succeed.

In his integrated action, collaboration requires a sense of ownership and participation, particularly at the policy level. A limitation, however, is whether the Maori have the capacity to plan and implement policy. It is common for New Zealand government officials to represent and provide for their sector's interest and their scope of vision is narrowed even further by the electoral cycle of three-years. There have been *iwi* who have developed longer-ranged plans,

but they are generally not passed inter-territorial nor are inter-territorial planning sessions established. Maori peoples generally act locally, and the prevailing opinion is that there is no such thing as a collective Maori culture, a Maori nation. The truth may be that there is no common, national forum for Maori to come together in a democratic fashion to develop plans and engage in an integrated implementation process. There are also no Maori international representative groups at the UN IP forums and they rely on being represented by a wider inter-regional group.

The *Hui Taumata Matauranga*, the gathering of Maori educational representatives, has served the *pro tem* role as the Maori educational authority, but it serves only in an advisory capacity to the New Zealand Ministry of Education and Ministry of Maori Affairs. The scope of its authority and capacity to create long-range planning is limited. There is no accountability of the *Hui Taumata Matauranga* to anyone, representation and organization has been ad hoc, and recommendations could amount to a wish list without the sophistication to be taken serious by government officials. The government of New Zealand and the Maori Nation need to determine how to develop a system that represents both perspectives and needs. The Maori Nation needs to determine what kind of representative structure fits indigenous patterns of governance and how this would fit in to the national governing structure. What sort of capacity building will be needed to assist the Maori Nation realize this structure? What sort of planning strategies will go in to developing long-range plans and who are the stakeholders? How will education planning be integrated into other countrywide needs and aspirations?

PART IV: Towards Enshrinement Policy of Maori Values

Reconstructing Schools within the metaphor of Whanua

Foundational to the policy recommendations contained herein is the understanding of the complexity of issues previously described, in particular issues imbued in Maori identity. Further, that an appreciation of the Maori ideal of whanua be inculcated in the dominant school structure and educational discourse. To this end, our analysis and recommendations strive for the reconstruction of New Zealand schools within an ideological and metaphorical application of whanua. As articulated previously, whanua is more complex than family structure, “for their tribal location and significant tribal markers such as mountains and rivers became an intrinsic part of their Maori identity. Maori people maintained respectful and spiritual connections with the land and the earth’s natural resources. Maori identity was intimately associated with the location of tribal boundaries, and therefore with the land” (Walker, 1989 as paraphrased in Moeke-Pickering, 1996). We conceive of New Zealand schools incorporating not solely IK into science curriculum but incorporating the cultural valuation of whanua into school practices. This strategy is intrinsic not only to multicultural science curriculum but further, to the maintenance of our pluralistic society. It is based on the supposition that educators can inculcate a connection to the land, in essence a sense of place, of belonging to a landscape, which is correlative to the metaphor of whanua. This appropriation of the Maori term is tantamount to the three policy implementation goals outlined below. Developing a sense of place contingent upon the incorporation of Maori understandings and techniques will empower local communities, strengthen sustainable practices, and augment multicultural unity. Our goal then, is to foster an appreciation for place, and a recognition that we are, all New Zealanders, bound to place, dependent upon local ecosystems, and that this recognition is infused with the multiplicity of perspectives inherent in our society. We urge for our collective identity be bound to the land, for a mere mention of ecological instruction or Maori IK is insufficient not only for cultural preservation but for ecosystem protection and valuation.

Integrating Maori IK into Western science instruction

As a preliminary step in the integration of IK into science instruction, issues of Western epistemological hegemony and cultural imperialism must be explicated. Historically, Western science has been viewed as an acultural, universal and therefore value-free explanatory system, while IK denotes strong cultural assumptions and mythology. “In education, Hodson (1993, p. 686) maintained that science curricula often ‘portray science as located within, and exclusively derived from a western cultural context. This implicit curriculum message is that the *only* science it western science” (Cobern and Loving, 1998). The negation of alternative ways of explaining the world maintains a colonial system of intellectual imperialism, denigrating one form of knowledge while elevating the dominant form, thus creating dependence upon the dominant system for material explanations.

This paper calls for reconstructing the definition of science from a multicultural perspective rather than the traditional, universalistic perspective. “Roling (1996) calls for constructivism to form the epistemological foundation of a new scientific paradigm in which it is assumed that knowledge is not a projection of an inherent reality but a social construction, the result of a collective learning process” (Robertson et al, 2000). In accordance with this constructivist approach, we contend that all science is imbedded in cultural assumptions and historical processes, which are deterministic to the ways knowledge is apprehended and encouraged. Rather than the limited definition of science often enumerated in the science curriculum, a multicultural approach would be a broadly inclusive conceptualization of science similar to that of Ogawa (1995) who refers to science as “‘a rational perceiving of reality’ and which then allows him to argue for the existence of legitimate multi-sciences” (Cobern and Loving, 1998). Recognition of IK is not enough, however, for true integration entails a re-evaluation of our present base of knowledge and an acceptance of alternative views as equally viable and valuable in the educational discourse. As Harmsworth (2002) suggests, efficacious incorporation of Maori IK,

> … also relies on an indigenous renaissance that takes traditional concepts and values and sets them equally in a contemporary context next to Western concepts and values, as a basis for living. This will require acknowledgement of the place and richness of indigenous culture within the global environment, and the opportunities for indigenous concepts and values to provide solutions to complex and compounding world problems.

Maintaining the autonomy of IK will not only validate IK on its own merits but will further allow for a critique of the often hegemonic Western science model.

IK must be viewed as a distinct form of knowledge and practitioners need be mindful of the problems inherent in measuring IK through a Western model and mindset. The dynamic element innate to IK and its instruction can be of great value to our collective educative attempts. IK should be viewed as a living knowledge, full of creativity and continuous learning. “It is precisely the need to pass on ‘knowledge’ in such a way that it will be absorbed by the next generation, which fosters a continuous creative change of the words used while keeping the essence intact, but not unchanging,” (Doebel, 2000) that can be of such great value to our efforts at multicultural unity and sustainability. Central to the instruction of IK is the fact that knowledge and wisdom, even abstract systems of learning and inquiry, are often encapsulated in metaphor. This can be a significant hurdle for those educators unfamiliar with Maori culture and sense of place (whanua). Thus, the collaboration of Maori experts is vital to successful implementation. As a means of achieving the goals contained in this proposal, the integration of IK is a positive step. Instructing all New Zealand school children in the cultural processes of Maori IK will engender a greater sense of our interdependence. “Through the use of methodologies such as observation and experimentation, and with traditional wisdom such as respect and harmony, TEK [Traditional Ecological Knowledge] generates knowledge that results

in a local perspective with a view of long-term sustainable societies with implications for local/global environmental issues" (Zarry, 1998).

As a way to bridge this discussion with the policy recommendations, we will close this section of the paper with highlighting common themes embedded within IK, and which is intrinsic to its integration into the science curriculum.

- Based on experience
- Often tested over centuries of use
- Developed collective data base of observable knowledge
- Adapted to local culture and environment
- Dynamic and changing; a living knowledge base
- Application of problem solving
- Oral transmission sometimes encapsulated in metaphor
- Not possible to separate IK from ethics, spirituality, metaphysics, ceremony, and social order
- Bridging the science of theory with the science of practice

Implementation goals for integrating IK into the science curriculum

Within this framework for integrating IK into the curriculum of science instruction, three interdependent goals are stressed. These include: community empowerment/unity, environmental sustainability and multiculturalism.

1. **Empowerment/Unity**

   Empowering Maori and local community action and validation of Maori knowledge systems are integral in an attempt to build not only a pluralistic society but also one that is sustainable. The development of curriculum must take place within a Maori context of environmental, educational, and community goals. While the historical trend has been one of exclusion of IK within the discipline of science, if our goal is to empower local communities then "the inclusion of indigenous, local and expert sources of knowledge will further deregulate ecological restoration into a pluralistic activity" (Robertson et al, 2000). Strengthening local communities and providing a strategy for the maintenance of Maori IK and its inclusion as a legitimate system of knowledge are stepping stones for the ultimate goal of Maori self-determination. Harmsworth (2002) articulates this proposition within the national authority structure, positing that "although the context within which indigenous groups plan, cooperate, and advance is often within a Western paradigm of legislative, political, and international frameworks, all are positioned to contribute to fundamental goals and aims for Maori self-determination." The guidelines presented herein are an important mechanism for the building of human and social capacity within Maori communities, and provides an inclusive curriculum agenda meant to foster increased Maori participation and engagement in educative attempts.

2. **Sustainability**

   The framing of this recommendation is based on the presupposition that cultural diversity maintains biological diversity, and that both provide the basis for sustainability. Preservation of biological diversity through the perpetuation of cultural diversity has become a global strategy. Warren as quoted in Snively and Corsiglia (1998) finds "The World Resource Institute's Global Diversity Strategy includes as one of its ten principles for conserving biodiversity the principle that cultural diversity is closely linked to biodiversity; conversely conserving biodiversity often helps strengthen cultural integrity and values." Holistic approaches to sustainable resource management and the

instruction of science find centrality within traditional Maori wisdom, techniques, values, and methodologies. However, "in virtually all cases, ultimate control and decision making still reside with government. True partnerships, involving the application of traditional knowledge in the sustainable management of the resources and biodiversity within protected areas, has been successfully implemented in Australia and Canada," (Craig et al, 2000) although this has not been the case in New Zealand. To rectify this situation, substantiation of Maori IK and local needs and community goals must be integrated into the totality of the system. As is apparent in other national contexts, the "long-term goal of sustainability is more likely where local communities are involved. Biodiversity benefits, as well the social, cultural, and economic well-being of local people" (2000). The inculcation of a sense of place, that is an intimate understanding of the interconnectedness of ecosystems; the plants, animals, waters, and landforms, is imperative in generating an appreciation for cultural and biological diversity.

3. **Multiculturalism**

New Zealand can pride itself on its inclusion of Maori cultural and linguistic studies within the mainstream education curriculum. "Compulsory courses in Maori culture and basic Maori language are part of all NZ programs of teacher education, and an approved national curriculum in Maori is offered in all elementary schools. From grade one, students become used to singing and counting in Maori, learning the names of basic objects, and following simple instructions in Maori language. Although such programs are elementary and can hardly be regarded as second-language education, they do make children aware of the bicultural nature of NZ society" (Barr, 1994). However, this validation of Maori knowledge and cultural worldview is stymied in the realm of science education. As part of the National Curriculum Framework, there is the explicit charge for inclusion of alternative perspectives with science instruction. Students "will examine the influence of science on the lives of people of different gender, cultures, and backgrounds," (McGee, 1995) and "will recognize the contribution that different perspectives make to the evolution of understanding in science. In New Zealand, the curriculum will recognize Maori and Pacific Islands knowledge about the natural and physical worlds" (1995). These mandates have not affected great change, however, as there continues to be a lack of Maori IK included within the curriculum, a lack of Maori traditional experts incorporated in instruction, and little critical analysis of the historical and cultural role Western science has played in New Zealand as a colonizing agent.

Community Development

Central to the integration of Maori IK into the science curriculum is the validation and empowerment of the Maori community itself. The issue of empowerment has previously been discussed, yet there are particular means by which developing the local Maori community can be achieved in this context. These include:

- Cataloging and archiving of IK. This will be a local, tribal affair at the onset, yet for implementation of this program, curriculum specialists must collaborate with Maori experts in creating dynamic, holistic alternative curriculum. "When it becomes important to access TEK, local people must become directly involved in the research. This 'inside' perspective is essential if the information is to be interpreted accurately" (Snively and Corsiglia, 1998). The gathering of information will most likely be an organic experience of the Maori community, yet teachers and their students should see this as yet another possibility for cross-cultural education. It must be remembered, however, that "this extractive approach can rob the narrative of one of its special values, the cultural context" (Robertson et al,

2000). This dilemma requires the constant oversight of Maori experts and community members to ensure validity.

- Training for local Maori people in different categories. Data gathering and research, training of Maori IK experts for their exposure in the classroom, and as advisors for schools and on the IK resource committee.
- Creation of community centers and museums, which will serve the dual purpose of continuing IK scientific education in an informal atmosphere and perpetuating local systems of knowledge and technology.

Critical Comparative Science Courses

These courses will provide pre-service teachers with exposure to alternative knowledge systems and how they can be incorporated into a curriculum dominated by the Western science model. The question all implementation actors should be asking is "should we develop a teaching approach that merely develops an appreciation for TEK and IK, or one that goes further into the implications of racism, history, and definitions; and attempts to deconstruct old prejudices" (Snively and Corsiglia, 1998). Within this framework, simply teaching appreciation is not enough. It is our intent to demonstrate through science curriculum that all science is imbued with great cultural assumptions. Thus, Western science in this context is viewed as a subculture of Western Culture.

We favor a critical approach to science instruction to strip away the inherent assumptions maintained in the discipline. Snively, (1995) posits that this "critical approach to teaching science can be used to help confront and eliminate racism, ignorance, stereotyping, prejudice and feelings of alienation. All students need to be encouraged to examine their own taken-for-granted assumptions and to distinguish between those that reflect perfectly natural and appropriate cultural preferences and those that are rooted in misinformation or an unwillingness to allow for the existence of alternative perspectives." Without stressing the legitimacy of one knowledge base over another, it is imperative within our multi-cultural nation that we insist upon a comparative, culturally sensitive approach to science instruction. This form of teaching training can balance the "struggle to assert the equal validity of Maori knowledge and frameworks and conversely to critically engage ideologies which reify Western knowledge (science) as being superior, more scientific, and therefore more legitimate" (Smith, 1992 as quoted in Snively and Corsiglia, 1998).

For in-service teachers, training workshops with a condensed comparative and critical framework will be provided before the beginning of the school term.

Curriculum Strategies

Alternative teaching strategies are required in successful implementation of this policy. Two brief examples of strategies are given in this document, though there are multiple forms in which to choose. As the previous discussion of Western Modern Science (WMS) and IK articulated there is a preponderance of narrowly defined assumptions governing the discipline of science. It is imperative that this view be broadened in order to give voice and legitimacy to Maori wisdom and position it as equally valuable to WMS in our explanation of the natural world. To accomplish this task, the lessons learned in the critical comparative science courses for teacher instruction must filter down through the instruction in the primary and secondary school systems. These lessons include examining multiple perspectives, examining imbedded cultural assumptions inherent in WMS, and critically assessing how these assumptions have directed epistemological processes. We contend that science does not exist value-free in a vacuum; rather, the discipline is fraught with cultural biases and values. From this can be gleaned what Cobern and Loving (1998) advocate as "epistemological pluralism," the opportunity to "wisely

discriminate amongst competing claims." To accomplish this directive, some specific strategies are provided:

- Teachers must be aware of the multiple perspectives they will encounter in their classrooms and encourage their dispensation. Teachers must further provide a critical analysis of the discipline and challenge students to examine culturally relevant assumptions within the fields of study.
- Science textbooks must incorporate the numerous contributions IK has made to long established indigenous communities and to Western culture and how both perspectives can be combined to benefit all groups of people.
- Teachers need to incorporate beliefs of students (indigenous in particular) and discuss multiple perspectives and traditions of science that engenders mutual respect and appreciation for divergent views.
- An integral step in the inclusion of cross cultural science studies is the gathering and documenting of local knowledge. This will be accomplished by Maori groups and communities, but can allow for the inclusion of school age children to take part. Forming collaborative experiences between Maori experts and school children is a tangible result of interviewing and recording Indigenous Knowledge. Much in the way enlisting local experts to teach in individual classrooms, this strategy can have great cross-cultural benefits for both Maori and white teachers and school children.
- Creation of an outdoor laboratory, where children can experience localized ecosystems is an important aspect of this program. Developing a sense of place is a first step in preserving biodiversity and alternative perspectives, and, as discussed above, inculcating sustainable practices. While this may necessitate community coordination, students and their teachers should be involved with local experts in the planning, maintenance and preservation of the area. The experiential knowledge gained of local plants, animals and ecological processes through Maori guides will be indispensable for instilling appreciation for multiple explanations and techniques of management, and in the perpetuation of whanua.

The two implementation models provided here assume the enlisting of local experts and Elders as experts. Further, the instruction is rooted in the locality and is experiential**.** These are important steps in creating efficacious programs. What is important to keep in mind is the application of the knowledge taught. The models begin with student application of knowledge in an experiential environment and move to understanding how and why the processes work. It is an example of teaching through rather than teaching about.

Alaska Context:

The first is a summation of the powerful implications of Culturally Responsive Science Curriculum in Alaska. This program provides a practical guide to incorporating IK into science education. The author describes the processes in explicating three important developments.

> The first is that a student might conceivably develop all of the common ground skills and understandings while working from and enhancing a traditional knowledge base. The second is that acquisition of the common ground, regardless of route, is a significant accomplishment. And the third is that exploration of a topic through multiple knowledge systems can only enrich perspective and create thoughtful dialog. One way of envisioning this merger would be for young children to consistently focus on traditional knowledge as a way of enhancing a cultural foundation and developing skills and knowledge common to both systems. As children get older, this traditional focus might continue with increased use and

discussion of some of the tools and procedures of Western Science and how they differ from traditional ways of knowing. By middle/high school, students could tackle more sophisticated concepts/skills and develop more sophisticated cultural understanding while also becoming more able to apply them in the real world, and more able to analyze and compare the insights and limitations of each system. In this way, students could have a truly rich and relevant education without demeaning or subjugating either knowledge system (Stephens, 2001).

The Handbook acknowledges that this process is different for each educator, yet provides general factors to be considered. These include:

- Cultural Relevance
  Examines topics of cultural significance, involves cultural experts, addresses cultural standards and provides adequate opportunity for reaching deeper cultural understanding.
- Standards Based
  Identifies an appropriate number of state science standards; describes specifically what is to be learned about those standards; and provides an adequate number of properly sequenced opportunities that lead students to a deeper understanding of the standards.
- Best Practices
  Incorporates strategies which are culturally appropriate; focuses on student understanding and use of knowledge, ideas and inquiry process; guides students in active and extended inquiry; and supports a classroom community with cooperation, shared responsibility and respect.
- Assessment
  Engages in ongoing assessment of student: understanding of highly valued, well-structured knowledge; skill development and reasoning; and ability to apply knowledge to the real world. Allows for diverse demonstrations of understanding.

The full document outlines strategies for involving Elders, linking instruction to locally specific topics and to various standards, and developing in students "a deeper understanding of culturally significant knowledge linked to science" (2001).

Thailand Context

The second example is from Thailand and focuses on discovery learning through "Plan International, a child-centered community development organization, [which] has supported schools and communities in northeastern Thailand in their efforts to develop local curricula" (Lucarelli, 2001). Within this model, curriculum was developed in line of local need and values. The author stresses that "when given the opportunity to develop a localized curriculum, the community and school must take a collective look at their unique history, culture and social issues. In the village of Ban Narai in Nong Bua Lampu province, the priority issue is the forest, and this has become the basis of the local curriculum" (2001). Localized curricular development in Ban Narai has focused on three modules for learning. They include:

1. Exploration of the ecosystem-"In the first module, 'Exploration of the ecosystem,' the children explore the geography of the forest, learning about its current condition and about its various plants and animals and how they contribute to a healthy ecosystem" (2001). This is a prime example of enlisting the expertise of local elders to explicate the local system.
2. Consciousness-raising -"aims to inspire the children to a sense of activism regarding deforestation near their village" (2001).

3. Reforestation - “the pupils organize community activities and invite their parents and other interested community members to replant trees and help to re-establish biodiversity in the local forest” (2001).

This is a prime example of knowledge engendering action and promoting sustainability and respect for multiple perspectives and ecosystems. Integrating localized and experiential IK into science curriculum will inspire the sense of place or Whanua this policy is attempting to reconstruct within the school system.

PART V: Policy Actions and Reflections on Other Contexts

1. Collaborative Governance (National and International Agency)

This is a proposed framework to assist governments in developing a sense of national unity and fostering the development of an official autonomous Indigenous Nation. The intent is not to create two separate nations, but rather, to create two structures that work collaboratively to construct a unified whole. We envision this as a process of civic engagement and participation by all stakeholders through pluralistic governance structures.

Policy Applications

- Reaffirm Indigenous Identity and the Indigenous Nation
  - Develop Indigenous identity committee composed of local governing representatives. Duties include establishing identity policies based on Maori sense of place and within the scope of New Zealand civic process; coordinating and representing Maori issues on a national and international level. This would require implementation strategies to include a number of capacity building instruments, mandates to include human rights protocols into national policies and laws, and inducements to encourage acceptance of and enlargement of the concept of a Maori Nation.
  - Creation of a national Civic Coordinating Council composed of equal representation from stakeholders. The Council will adopt international indigenous peoples rights, develop a framework for resolution of disputes and bridging between communities, and propose legislative change regarding issues of interest to indigenous people. The Council will establish a representative group to advocate for indigenous issues at national, regional and international levels. The Council will identify appropriate UN and NGOs working with indigenous peoples and align their efforts with them. This Council will also elect members to be representatives at UN and other regional and international IP conferences and meetings.
- One Nation Governance, Two Nation Identity
  - Government officials will approach The World Bank and propose a long-term plan to develop its national collaborative approach with indigenous peoples. The Bank would be requested to sponsor the plan and give technical advice by their subject-matter experts (SMEs) and financial backing. Funding would be used to create capacity building instruments across sectors, mandates to circumvent political entropy and serving special interests, and inducements to organize local governing tribunals in indigenous and non-indigenous communities to support local governance and civic processes, and to uphold the indigenous efforts to reclaim their cultural heritage.
  - Government officials and the Indigenous Nation will both be bridging policy and politics with instruments developed collaboratively and supported by UN agencies, regional representative bodies, and NGOs.

Parties and Stakeholders

The World Bank, other donors, donor’s SMEs, Government officials, Ministry of Education, Ministry of Indigenous Affairs, Indigenous Nation representatives, United Nation experts (UNESCO, UNDP)

2. Applied Pedagogy

These recommendations suggest a holistic approach to pedagogic restructuring; including a reorientation of teacher education and primary and secondary school practices. While these recommendations have been described previously throughout this paper, a short reiteration of them in a consolidated form is necessary.

Policy Applications:

- Affirm Traditional Means of Learning and Knowing
  - Government officials, as part of its long-term plan, would be firming up through mandates and inducements to reinforce policies that encourage reclamation of indigenous traditions, cultural heritage, indigenous languages, and indigenous knowledge. These policies will be a part of the cross-sector comprehensive plan proposed to The World Bank and other financial and social institutions.
  - In New Zealand, the Government would formalize and empower the *Hui Traumata Matauranga* (traditional education gatherings) in the form of a permanent Maori education council. The *Hui* would no longer just be an occasional advisory board, but would have the capacity to make formal recommendations at the national level and would have an oversight position at the local (Maori Nation) level. The *Hui* would be composed of at least 67% Maori and would utilize traditional concepts of governance to create the structure of authority. Three of the main functions of the *Hui* would be to: be involved in the national education decision-making process; make decisions regarding the Maori curriculum; coordinate with the Ministries of Education and Maori Development.
  - The GNZ would collaborate with UNESCO to facilitate this formalization by offering capacity building in the areas of policy planning; governance and administration; training of teacher trainers; upgrading the facilities and texts at Maori schools (re-proportioning the education budget); and support in determining issues related to recovery and implementation of traditional education and knowledge.
  - Similar structures could be devised by other nations and regions to address pedogological issues related to indigenous people.

- *Archiving Indigenous Knowledge (IK)*

  This aspect is an important element in empowering local indigenous communities and maintaining the autonomy and integration of IK. This is a first step in creating a truly representational multicultural science curriculum.
  - Capacity building is an intrinsic aspect of this strategy, with training indigenous researchers and IK experts in the collection of local knowledge. What is important is the development of local indigenous trainers who can be responsible for training other minorities in this practice. This promotes a sense of local intellectual property rights, is a sustainable practice, and allows locals to train locals. Inducements in the form of grants and training partnerships will be necessary for the inclusion of indigenous experts and researchers.
- *Critical Comparative Science Course*
  - Creation of a mandatory, critical and comparative science course for pre-service teachers, and workshops for in-service teachers as a means for building capacity within the field of science education. While teacher colleges will be the requisite implementing authority, collaboration between the Ministry of Indigenous Development, Ministry of Education, and Indigenous Educational Council will have oversight of policy directives (including curriculum design and application). Mandates in the form of specific teacher requirements from the national government are necessary to augment this strategy.

- *Curriculum*
  - Curriculum design based upon the central tenants of locality and experiential knowledge should be employed as a means to create a sense of place (whanua in New Zealand). Included in this aspect should be the adoption of multicultural scientific textbooks, and the inclusion of indigenous experts as means of inculcating an understanding of IK. This is a form of capacity building in that teachers and thus their students will develop a greater awareness of alternative perspectives, which is a necessity within a pluralistic nation.
- *Creation of outdoor, experiential learning environments*
  - With the direction of the school affiliated IK Council and local experts, outdoor learning centers should be developed as a means to promote ecological understandings and IK applications within environmental education. Grants and other forms of monetary funding is necessary for schools to create micro-ecosystems unique to their locale. These inducements, however, will achieve an enormous reward, as teachers, students, and local Maori collaborate to design, research, and create functioning native ecosystems in which hands-on learning with the expertise of local Maori will be practiced.
- *Local IK Councils*
  - These councils will provide local, direct oversight of implementation directives, and will be the intermediary between the locale and central administrators. Due to its eclectic assemblage, considerable communicative practice will be in order. Further, it may be necessary for training of those individuals unfamiliar with this form of administrative work. Some kind of inducement could be required for those Maori and other local experts whose time should be compensated, although, as a community oriented project, this may not be problematic.

Parties and Stakeholders

The World Bank, donors, donor's SMEs, GNZ, Ministry of Education, Ministry of Indigenous Affairs, Maori *Hui Traumata Matauranga*, local indigenous education representatives, indigenous curriculum specialists, UNESCO advisors

3. Community Knowledge and Learning Communities

In order for Indigenous Knowledge to be incorporated into a national curriculum, the national policy for knowledge management will need to be embedded in long-range planning and educational policies. The various governments will have to determine through careful analysis what sorts of knowledge it wants to manage and resolve *cultural learning* issues. Cultural learning issues pertain to how people learn; how knowledge learned is transformed to adapt to multiple contexts; how knowledge is best passed, preserved, and presented; and how knowledge evolves in a given, contextual environment. The government will find it necessary to make this effort through specific actions that are neither piecemeal nor taken lightly. This important work will take considerable collaborative actions between stakeholders.

Policy Applications

- Build Collaborative Capacity
  - Adopt a working framework and definition of what constitutes "collaboration". A beginning point of reference may be Michael Schrage's (2001) definition of collaboration in which relationship is greater than the sum of the individual's (self or culture) expertise. The relationship, in other words, is more important than any bit of information. He explains that the relationship is further "texturized" by the organization of a *shared space* created through continual communication patterns, i.e., any medium where design behaviors are activated with the intention of goal-

oriented tasks that create value. Shared spaces encourage innovation or a combination of efficiency and knowledge construction. The shared space and value creation process allows the group to establish a *shared understanding* to work towards a specific goal.
    - The Government would play the role as overseer of the collaborative aspect of all indigenous knowledge/peoples projects and, in turn, would answer to donors through compliance to the specifics defined in the implementation agreement.
    - Capacity building in collaborative approaches would be through a workshop where the framework that defines the collaborative process, establishing the various goals, and conflict management skills would be the focus.
- Storage of Learning and Knowledge Management Systems
    - The Government to determine the political ramifications of IK/IP policy changes. The Government will provide a capacity building feature to inform all stakeholders of political process, particularly in light of the proposed changes.
    - The Government to develop project reporting and information management systems across sectors will need to develop sophisticated databases that will be able to store valuable practices and "lessons learned" regarding IK/IP related projects.
    - Technicians and social scientists to devise a means to measure and codify the experiences of the stakeholders, how systems work, and map the formal and informal patterns that lead to networks of relations and the processes of learning and knowing.
    - Internet access to be provided to all communities and clear resolution of issues related to information and knowledge, i.e., sufficient infrastructure, free flow of information, and privatization/liberalization of telecommunications.
- Collecting & Cataloging IK
    - Collection and storage of IK will need careful consideration and innovative strategizing. Since IK normally relies on a dynamic, oral process of reiteration and refinement, this will be particularly difficult. Planning and conceptual development sessions will be crucial in determining strategies and procedures. Sessions would involve technical meetings; ministry level collaborations; indigenous subject-matter experts to be involved in ministry level discussions; Ministry of Indigenous Development to coordinate Indigenous Council meetings and strategy sessions related to IK cataloging; and indigenous councils to coordinate community level collection and to serve in an advisory capacity. Accomplishment of these will take a good amount of capacity building due to its uncustomary approaches; inducements to encourage participation and effort at community level; and mandates will come in the form of rearranging ministry portfolios and empowering community and local representatives.

Parties and Stakeholders

The World Bank, donors, donor's SMEs, GNZ, Ministry of Education, Ministry of Indigenous Affairs, Ministry of Environment, Indigenous Council representatives, Technical experts (telecommunications, communication, computer, database, sociologists)

4. External Collaborations

There are a number of external actors that are working with both Indigenous Peoples and Indigenous Knowledge on a global and regional basis. It will be to the advantage of the Government to align with these agencies to make their tasks more effective and equitable for all parties.

Policy Applications

- United Nations Assistance

- United Nations Human Rights Organization (UNHRO), United Nations Education, Science and Culture Organization (UNESCO), United Nations Development Program (UNDP), Economic Social Council of the Working Group on Indigenous Populations, International Court of Justice, World Intellectual Property Organization (WIPO), Aboriginal and Torres Straight Islander Commission, World Council of Indigenous People, Indigenous World Association, and the International Organization of Indigenous Resource Development are some of the agencies working with indigenous people and indigenous knowledge. The Maori Nation is not represented in any indigenous peoples regional council or at any UN meetings. It behooves the Maori Nation to develop a representative organization to attend meetings and voice their issues.
- The Government to develop a policy strategy in conjunction with WIPO to protect the intellectual property rights of indigenous people. Indigenous knowledge is the heritage and resource of a nation and should be guaranteed protection; especially considering that very little IK around the world is given necessary protection and nations frequently lose resources and access to the wealth accrued to discoveries marketed from IK.
- The WIPO can assist in giving advice and expertise on the collection and cataloging of IK, so the Government should make every effort to develop their long-range plans with WIPO as part of the strategy.
- UNESCO will be an exceptional education resource in the development of IP curriculum and teacher training.
- UNDP will be instrumental in assisting the development of application of IK to economic and social development programs. In addition, preservation of language, culture, and biodiversity would all be supported by projects developed by UNDP. The land tenure issues that are related to Maori identity could be an element of UNDP's project development.
- Indigenous representatives will receive training in planning and collaborating with the Government and the UN organizations.

Parties and Stakeholders

UNHRO, UNESCO, UNDP, Economic Social Council of the Working Group on Indigenous Populations, International Court of Justice, WIPO, regional representative groups.

PART VI: Concluding Remarks and Proposed Remedies

Proposed Remedies

There are not many who would disagree with the notion that the educational system that provides for indigenous and ethnic minority populations is inefficient and ineffective. We assert that the problem is not necessarily with the system in place, but that it is a systemic problem in which centralized control and screening and sorting are the fundamental processes that doom the schools to be a drag on public resources. The system has either purposively or inadvertently screened out the majority of the indigenous and minority students, leaving them unable to be contributors to the public good, and unable to make use of public resources to be innovative within the system. Given the educational goals influenced by globalization and the economic constraints effecting indigenous people, the rate of return of investing in educating these local areas is marginally low. On top of this, schools operate without the aid of educational incentive – the value of education is diminished because the goals are not of consequence to the local culture.

For indigenous/minority communities, elementary school has the highest rate of return, with most of the essential skills provided during that time. The unfortunate factor is that the majority

of students drop out due to what we would classify as socio-cultural and identity-related issues, i.e., language, non-contextual education offering few appropriation skills, and a lack of funds for incidental costs of education (transportation, food, loss of labor). What would make it economically and technically feasible for rural and village students and their families to attend school? This missing piece is culturally relevant knowledge that would lead to innovation and the skill to appropriate ideas from different contexts.

The most important consideration in developing the educational system has been the exclusion of local and indigenous knowledge in the development of curriculum and schools. We propose that local and indigenous knowledge be made part of the national curriculum with additional support to give local cultures skills relevant to their locale. Ideas that also need encouragement are the concept of *cultural citizenship* and the establishment of a regional identity and a broad international association of indigenous groups actively exchanging protective and innovative ideas. The citizenship and regional identity developments would allow for the national governments to decentralize local control of curriculum development and assessment, while at the national level the associated ministries can centralize national/regional progress, material development strategies, potential educational distribution processes, information distribution systems, and job development potential (Jones, 2002). Cultural citizenship and regional identity would allow people to interact with a wider range of people and ideas across regions, quickening the appropriation of ideas and enrichening the public good and national knowledge coffers.

Educational incentive is crucial and the most important incentives to people involve identity, community, and self-efficacy (in the form of ability to control of ones destiny). The localization of education would offer the incentive of identity and situated appropriation of skills to allow for developing necessary resources for innovative responses to the local environment and social mobility within the larger context of the nation and region. In making local knowledge part of the national and local curriculum, local and indigenous knowledge would become non-rivalrous and non-exclusive – that is, this knowledge would be a social good. The argument that not being able to personally patent knowledge such as herbal remedies would take away incentive is generally contrary to indigenous cultural norms and ideals. Additionally, the ability to patent these remedies will not change the inherent injustices that beset minority peoples; but the value of identity, community development, and empowerment found in the decision-making process are likely to be valued in much greater quantities that personal competition for limited resources. There is also the opportunity for unbounded growth through the innovative application of knowledge on a wider level beyond the community and region. This might involve the acquisition of some profits from community and national patents.

To develop *educational capital*, the benefits accrued from knowledge that leads to innovation, the rural and village primary schools need to be supported and subsidized at the national level. There is a need to sponsor a scholarship program for indigenous communities to send select students to attend high schools and universities with the stipulation of returning to their home community to pass their knowledge to the community. Particular effort must be made for research into identifying and providing appropriate technologies to the rural and village communities. It is these sorts of initiatives that not only provide educational capital and incentive, but also create a community market where the democratic needs are introduced and promulgated. If the community doesn't create the market, the demand is an imposition that enslaves.

The crisis that faces education in some nations as identified in this paper will not require an overhaul to find a remedy. It will take a bold move, perhaps a move filled with risk to respond to

a situation that will disrupt the downward spiraling status quo – but it is a move that stands to benefit rural and village communities, the nation, and transcontinental regions. The movement towards regional identity and enshrining local and indigenous knowledge is a progressive and powerful one that promises a potential rich lode of economic and educational capital. Will the crisis be averted, or will there be an aversion to risk?

Concluding Remarks – New Zealand and Beyond

It is reasonable to expect that there will be those New Zealand nationals who oppose the idea of a Maori Nation and supporting the integration of Maori indigenous knowledge into the national school curriculum. The objectors are believed to be a minority and have legitimate concerns regarding human rights pitted against democratic rights. The Government of New Zealand will have to uphold national democratic principles and at the same time ensure autonomy of the Maori Nation and all the rights to which indigenous peoples are entitled. The current emphasis on New Zealand unity needs to continue and be the responsibility of every citizen. The Maori Nation holds the Treaty of Waitangi as the condition of trust and the basis of relationship with the non-Maori. Non-Maori need to respect this document in the same manner and perceive it as the unifying document that has allowed the relationship to commence and endure. Above all, it must be remembered that unity does not equate assimilation – an approach that weakens both democratic, civic activity and indigenous identity. Productive societies find their own means of interaction and unity from strength of civic process, unfettered identity, and shared spaces.

The Maori Nation was nearly decimated by the loss of civic process, fettered identity, and loss of place through appropriation of rights, land, and attempts to assimilate culture into a meaningless context. Unification within New Zealand will only be possible if there is a designed program to reclaim and reaffirm Maori culture, language, traditions, and sense of place. This is critical since the sense of place is closely linked with Maori indigenous knowledge and identity. Maori indigenous knowledge is related to the ecological balance of their habitat, making preservation of biodiversity an essential element of their rights and sense of identity. The GNZ can do little harm and provide great potential strength by pursuing measures to acknowledge the indigenous knowledge already embedded in the historical contours of the country and make it an essential element of the national resource base. There is also great merit in making the environment and its bio-diversity elements of societies' evolvement toward unity in diversity.

The potential benefits of a nation that is unified through the environment and diversity of knowledge of that environment is immeasurable. The potential for not doing this is measured in degrees of fear and despair, environmental degradation, political and economic destabilization, and social travail. It is the opinion of this consultancy that the long-vision of the GNZ will find great benefits if it were to focus on elements presented in this paper as a means to unity, a sustainable future, social stability, and prosperity.

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