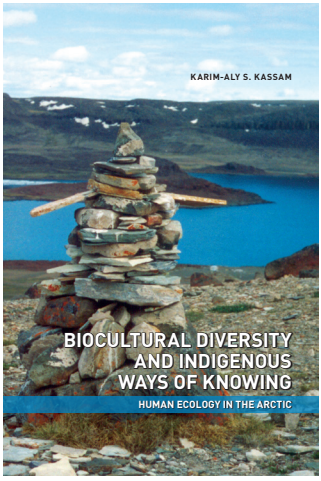

BIOCULTURAL DIVERSITY AND INDIGENOUS WAYS OF KNOWING: HUMAN ECOLOGY IN THE ARCTIC

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ISBN 978-1-55238-566-1

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CHAPTER 6

6: Mapping Human Ecology: A Transformative Act

> O humankind! We created you from a single pair of a male and a female, and made you into nations and tribes so that you may know each other (*Quran* 1975: 49, 13).

6.1. Introduction

The mapping of human ecological relations illustrates in an explicit way the transformation of knowing *how* to knowing *that*. This transformation reveals that power, like knowledge, is relational; it is not an entity and, therefore, cannot be possessed. Harley (2001: 79), in his *The New Nature of Maps*, argues that: "The social history of maps, unlike literature, art, or music, appears to have few genuinely popular, alternative, or subversive modes of expression. Maps are pre-eminently a language of power, not protest." Harley is only partially correct. While it is true that maps express the language of power, human ecological mapping demonstrates that there are alternative expressions of the cartographic venture which are popularly supported by indigenous peoples and take map making outside the domain of the geographer-conqueror.

A cartographic venture with participation of otherwise marginalized groups is elsewhere described as "counter-mapping." Some of the objectives of counter-mapping include: recognition of (land) rights; protecting and promoting biological and cultural diversity; demarcating and protecting traditional territories; assembling, documenting, and safeguarding local knowledge; facilitating management for land use; generating community awareness and self-empowerment; recording baseline data; and enabling conflict resolution (Arvelo-Jiménez and Conn 1995; Chambers 1997; Eghenter 2000; Gonzalez et al. 1995; Hodgson and Schroeder 2002; Hughes 1999; Nietschmann 1995; Peluso 1995; Poole 1995; Sirait et al. 1994; Sparke 1998; St. Martin 2001). Counter-mapping shares similarities with human ecological mapping, as both primarily seek to realign power relations through the application of local knowledge of land use.

Participation of the knowledge holders in the process of mapping and strategically applying their know *how* is fundamental to shifting power relations. The objectives of this chapter are to explain the methodology of human ecological mapping, establish its historical significance in the Canadian north, and provide meaningful examples of its communicative capacity, its ability to engender human agency, and its role in intergenerational transfer of knowledge. In this chapter we will:

1. Discuss the power of maps (6.2),
2. Explain human ecological maps (6.3),
3. Give historical examples of human ecological mapping (6.4), and
4. Examine current research for strategic application of human ecological mapping (6.5).

6.2. The Power of Maps

The who, what, where, and how of power is recognized in relationships. Michel Foucault (1987) described this relational nature of power by linking

it to knowledge. Relations take place in the particular, the concrete. Power, therefore, is exercised, not seized (not possessed like an entity). The notion of *phronesis* as described by Aristotle in terms of the management of the household or state through practical wisdom speaks to the relational nature of knowledge and power. Power and knowledge are deeply connected; the application of knowledge implies the exercise of power and the exercise of power implies the application of knowledge. Like knowledge, relations of power do not stand apart; they are part of human ecological relations. Power is exercised in dynamic interactions from multiple points of reference and is often unequal. Resistance is also inherent to the application of power. Because of its relational nature and its link to knowledge, power has the ability to transform perception. As such, power must not be interpreted as inherently negative. It is productive because it is part of the relations that produce reality (Flyvbjerg 2001).

The map is a mimetic metaphor of the relational nature of knowledge and power dynamic. Mapping is an act of demarcation which creates boundaries and constructs identities. Geography, as a language, is imbued with spatial metaphors revealing the exercise of power. The word 'region,' for instance, draws its roots from the French word *regere*: to rule. 'Province' is from the Latin *provincia*, referring to a conquered territory (Foucault 1980). As a practical instrument of colonial power, the map enabled access to 'new' lands. In the cultural dimension, the map was a visual metaphor, a new way of looking at the 'known' world, and a way of fashioning attitudes of Europeans at home. The *double entendre* is conveyed through Orientalist scholarship. As a noun, Orientalism, the field of study, expresses the west (occident) in relation to the east (orient). As a verb, the activity of Orientalism locates the individual or the culture of the occidental researcher in relation to the 'other.' Both usages are relational. A key feature of this relation is that the process of orientation has occurred through scholarship, which explained the unfamiliar, enigmatic, and amorphous 'other' in the language and cultural paradigm of the occident. The map not only served as an instrument of military occupation, but as an agent of cultural imperialism. The application of knowledge not only manifests itself in an overt exercise of power, but also serves as a more subtle yet equally effective strategy to transform attitudes in the domain of culture (Harley 2001; Kassam

and Maher 2000; Said 1993; 1994; Winichakul 1994). Hence, 'discovery' of 'new worlds' meant possession in the cultural terms of the occident (Harley 1992). The search for the Northwest Passage from the Atlantic to the Pacific is an example of this possessive impulse.

The early use of indigenous knowledge in mapping to spearhead conquest and resource extraction is well documented (Belyea 1992; Latour 1986; 1987; Rundstrom 1990; Whitfield 2000; Winichakul 1994; Wright 1993). In the Arctic, mapping based on indigenous knowledge was crucial to exploration motivated by the goal of finding the Northwest Passage in order to gain access to imagined riches. For example, the Hudson's Bay Company was seeking geographic knowledge not only to control and expand its lucrative fur trading business, but also to access new markets and products. In 1716, ten Chipewyan drew a map at Fort York which identified the 'copper mines.' This provided the impetus for expeditions to seek the Northwest Passage by land to Coppermine. In 1767 two Chipewyan leaders returned to Prince of Wales Fort on Hudson Bay from a five-year voyage to Coppermine (Kugluktuk) and traced a map onto deer hide. This map became the basis of an employee of the Hudson's Bay Company, Samuel Hearne's, third, final, and successful voyage to find the Northwest Passage by land. In this expedition Hearne was accompanied by the Chipewyan leader Matonabbee and his men (Glover 1983; Helm 1989; Kassam and Maher 2000; Lewis 1998; Nuffield 2001; Speck 1983). Similarly, Captain Parry, Commander of the British Admiralty, in his second expedition to discover the Northwest Passage from the Atlantic to the Pacific (1821–1823), describes in his journal how the Inuit prepared maps. He explains how he and Captain Lyon obtained geographical knowledge from an Inuit woman named Iligliuk, which was later verified by another Inuit, a man named Ewerat (Bravo 1996; Kassam and Maher 2000; Parry 1969). Acquainted with the voyage of Captains Parry and Lyon, Sir John Ross, a Captain in the Royal Navy, undertook a voyage (from 1829 to 1833) to discover the Northwest Passage. In his journal, Ross describes how he used the same technique to gain geographical knowledge from the Inuit. Ross gave a sketch of the already known land to Ikmallik, whom he identified as a "hydrographer." The Inuit man, Ikmallik, then drew him a map to guide him on his voyage (Kassam and Maher 2000;

Ross 1969). In 1883–84, Franz Boas also relied heavily on Inuit map making to collect ethnographic and cartographic knowledge (Boas 1998):

> The Eskimo exhibit a thorough knowledge of the geography of their country.… They have a clear conception of all the countries they have seen or heard of, knowing the distances by day's journeys, or, as they say, by sleeps, and the directions by the cardinal points.
>
> As their knowledge of all the directions is very detailed and they are skilful draftsmen they can draw very good charts. If a man intends to visit a country little known to him, he has a map drawn in the snow by some one well acquainted there and these maps are so good that every point can be recognized. Their way of drawing is to first mark some points the relative positions of which are well known. They like to stand on a hill and look around in order to place these correctly. This done, the details are inserted. It is remarkable that their ideas of the relative position and direction of coasts far distant one from another are so very clear (Boas 1964: 235–36).

Beyond the obvious conclusion that settlement of the north, and specifically the sub-Arctic and Arctic, depended significantly on indigenous knowledge and mapping, these early maps are attempts at "commensurability" – a means to translate indigenous spatial frameworks to European geographical terms (Bravo 1996). This is significant because it illustrates the communicative capacity of maps across cultures.

6.3. Human Ecological Maps Explained

Maps are knowledge as power. Using the language of symbols, maps represent a social product mediating cultural systems and individual actions. The selectivity of content and style of representation are a means of conceiving and structuring the world in a manner that exerts a particular set of relations. The human ecological map is a social product that articulates

indigenous cultural values through individual actions of subsistence hunters and gatherers on the foundation of nature. In this sense, the human ecological map reclaims the 'other' and seeks to describe indigenous cultural and ecological space based on indigenous terms.

The human ecological map shares the following characteristics with any other cartographic venture (Keates 1982: 62–86; Kolacny 1969: 74–49; Robinson and Pechenik 1976: 23–42; Winichakul 1994: 53–55):

1. It makes a claim to reality in the form of two-dimensional graphics;
2. This two-dimensional format for three-dimensional relations results in selection, generalization, and approximation of details;
3. Therefore, the map involves interpretation;
4. Paradoxically, despite interpretation, the use of symbols and other devices seeks to make the map literal in relation to experienced reality so that it has mimetic quality;
5. The map is communicative for both producers and users because of its mediating capacity to illustrate human relations with the environment; and
6. Thus, the map has a predictive quality because it points to the implication of human action.

The human ecological map represents practical knowing, or *phronesis*. It is not imagined space like a nation or state; instead its identity arises from the concrete. It is context-dependent in that knowing *how* sustains a livelihood from the land and sea for the management of the household and community. Nor is it geographical in a strict Cartesian sense; it is a product of the interplay of the cultural, social, ecological, and physical context. It is simultaneously a cognitive and practical exercise. The map arises from knowing *how* to live on the land and sea. Its reading represents the process of learning *how* and the completed map represents knowing *that* (see

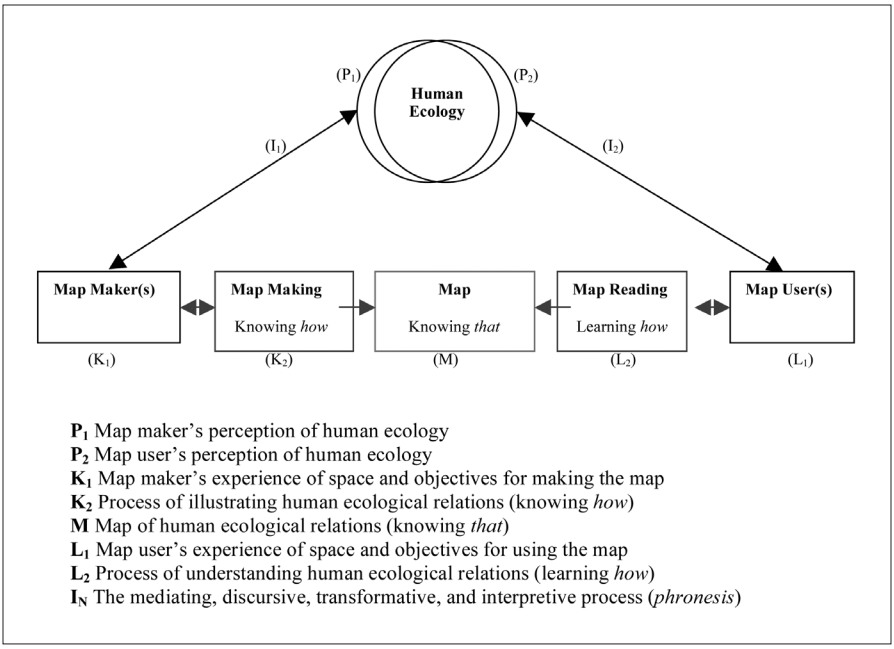

Figure 6.1: Human Ecological Mapping Process and Use.

foldout of the human ecological map of Ulukhaktok). The process is like a circuit, iterative because each time the map is used it is remade and the process begins again; as such it becomes dynamic and is modified by the experience of the user (see figure 6.1).

The maker(s) perceive (P) geographical terrain with reference to their experience of human ecological relations (I). Using participatory mapping techniques human ecological knowledge (K) is transformed into data that produce the map (M). The user(s) interprets this information (L). These interpretations (I) form an understanding of human ecological relations (P). When the map making process is participatory, the potential for the double hermeneutic arises as the know *how* of many individuals displays the human ecological relations of a community. A double hermeneutic occurs when self-interpreting map makers also use the map and view both their own actions in relation to context as well as other people's actions. A human ecological map engenders such reflexivity, which is the ability to react upon

itself, an essential feature in enabling change. Reflexivity is at the heart of human agency. Thus, the human ecological map not only transforms three-dimensional into two-dimensional spatial representation of knowledge, but it has the power to transform perception.

One of the fundamental features of human ecological maps is their reliance on the use of narratives and oral histories in their construction. Firmly embedded within these narratives is the thread of lived experience (knowing *how*) and the wisdom derived from the practice of living from the sea and land (*phronesis*). While maps of human ecology incorporate modern cartographic conventions in their production, they do not rely for their veracity on appeals to scientific or cartographic standards. Validity is achieved by practice, through the lived experiences and accumulated knowledge of the indigenous peoples who participate in the creation of the maps. Derived primarily through interviews carried out within the indigenous context and supported by field visits, these maps reveal that knowledge exists primarily within human ecological relations.

Most importantly, human ecological maps represent the deep connectivity of a specific group within a specific bio-region. Quintessentially, a land and marine use map articulated by a community is a metaphor for indigenous human ecology. For reasons of commensurability, maps of land and marine use are influenced in their creation by the availability and accessibility of topographic databases. These human ecological maps may contain a multiplicity of locally gained information depicting subsistence activities on the land and sea (Brody 1988; Fort McKay First Nations 1994; Robinson, Garvin, and Hodgson 1994; Robinson and Kassam 1998; Bigstone Cree Nation and Metis People of Kituskeenow 1999; Dene Tha Nation 1997).

For example, the method of production of the base topographical map for the Kola Sami in the context of the uncertain political conditions of Russia in 1995 is informative. As one large topographical map of this highly militarized region was not available to the public, the map of the Kola Peninsula was made by grafting together numerous smaller maps. First, smaller topographical maps were purchased at a bookstore in Murmansk; second, these maps were then transported to Finland; third, from there they were couriered to Canada; fourth, in Canada they were combined together to

form a large topographical map; fifth, they were taken back to the Kola Peninsula, crossing military checkpoints on the way from Fino-Scandinavia to Russia; and finally the Sami confirmed that indeed this larger base map reflected the extent of their land and marine use.[1]

Some of the current issues in Arctic and sub-Arctic human ecology include: land claims involving indigenous peoples and their national governments, the impact of chemical pollutants on Arctic marine communities, the effects of climate change, sustainable use of natural resources (both renewable and non-renewable), and the transfer of ecological knowledge held by indigenous peoples to the next generation. An understanding of the human ecology of indigenous people is critical to each one of these issues. Human ecology is symbolically and literally illustrated through mapping of land and marine use. Such land and marine use maps represent the interconnectivity of cultural, social, biological, and physical elements of the indigenous world, laid out and given spatial, temporal, and representational form within a topographic map. These maps portray the relationships among people, their communities, and the surrounding and supporting biotic systems by providing a graphic representation of how indigenous people within a specific geographic region interact with and use resources derived from the land and sea. The themes of these maps may be broad, depicting ethnographic, historical, and/or current information on land and marine use patterns. They may also represent specific ecological knowledge by providing information on hunting, fishing, herding, trapping, the utilization of plant species, forestry practices, wildlife migration patterns, and locations of sacred sites, all of which are of socio-cultural significance and important to the livelihood of a contemporary indigenous community (Kassam and the Soaring Eagle Friendship Centre 2001; Kassam and Graham 1999; Kassam and the Wainwright Traditional Council 2001).

Human ecological mapping establishes boundaries on the basis of the practice of subsistence living. However, these boundaries are mediated by natural features such as mountains and waterways. The boundary is not a single artificial line creating borders. The Inuit define regions by the use of waterways (Wiebe 2003). Similarly, on the Kola Peninsula, the Sami, even after forced collectivization of their reindeer herds under communism, defined the territory of different reindeer herds or brigades by the rivers

waterways and the tree line (Robinson and Kassam 1998). The boundary is demarcated by human ecological relations more like a zone rather than a single line drawn by a ruler. These human ecological relations also define the political space based on land use and occupancy. Land and marine use maps change the focus solely from imposed boundaries to human ecological relationships. What is at first glance a topographical map made in the Cartesian tradition becomes, with human ecological relations, crowded with complex biological and cultural connectivity, and not just empty space with names on it.[2] While the average topographical map takes the human out *of* nature, thereby promoting the nature-culture dichotomy, the human ecological map seeks to place the human *in* nature, thus collapsing the duality. Human ecological maps resemble a third space where different ways of knowing meet and different types of geographic knowledge co-exist through encounter and synthesis.

6.4. Some Historical Examples of Mapping Human Ecology

Human ecological maps confirm indigenous power defined by human ecological relations and thereby, indigenous rights. Land and marine use is one of the most effective ways to map human ecology. Noted below are four examples of human ecological mapping of indigenous use of the land and sea. The first example is from the work of Franz Boas, a German scholar trained in physics, mathematics, and geography. The experience of living with the Inuit of Baffin Island was a significant turning point in his life. Subsequently, Boas helped found the field of cultural anthropology as a discipline in the social sciences. Second, the Inuit Land Use and Occupancy Project represents unique opportunities and challenges in the Canadian north. This project was supported by the Canadian federal government because it could help resolve differing objectives of development, sustainable subsistence use, and conservation. It also mediates the 'frontier' perception of the north as ripe for resource exploitation by southern interests and the perception of the north as a 'homeland' within which to maintain a sustainable livelihood (Rees 1987). Third, the Mackenzie Valley Pipeline Inquiry put land use planning, and therefore, indigenous human ecology

on the Canadian political planning agenda when Justice Thomas Berger maintained that resource development could only proceed after settlement of indigenous land claims (Fenge 1987). Finally, the fourth example outlines the work undertaken at the Arctic Institute of North America in the 1990s in which human ecological mapping took place in the boreal forest in partnership with indigenous communities and with support from the government and private sectors in the western Canadian provincial north. The objective of providing these historical examples is to establish that human ecological mapping is an established fact in the Canadian north.

6.4.1. Pakkak's Map

Mapping has been used as a means to communicate the human ecology of indigenous Arctic peoples cross-culturally. For instance, Franz Boas describes in his diary on Friday, October 26, 1883, his interaction with an Inuit man named Pakkak who had sketched for him a map, taught him to pronounce local place names, and showed him sites for summer camps for caribou hunting (Boas 1998: 127). Two key points need to be noted from this early example of human ecological mapping: first, that there is commensurability between Pakkak's perception of space and that of Boas the geographer; and second, that the map represents Inuit experience in the form of a visual metaphor of indigenous knowledge. The mimetic metaphor is complemented by a verbal explanation. In other words, visual images are contextualized by words, and conversely words can be contextualized by visual images. This suggests the potential for the multiplicity of meanings or hermeneutic associated with a metaphor. In fact, the interaction of the oral with the visual is pregnant with multiple meanings and with the possibility of transforming perceptions.

6.4.2. The Inuit Land Use Occupancy Project

Almost a hundred years later, in 1973, the Inuit Tapirisat of Canada (ITC) undertook to document human ecology in order to create a comprehensive and verifiable record of Inuit land use and occupancy across the Canadian Arctic. The result was a three-volume work outlining the Inuit Land Use and Occupancy Project (Milton Freeman Research Limited 1976a). On the basis of 1,600 individual land and marine use maps from an estimated 2,000

interviews with Inuit in 33 communities covering approximately 1.5 million square miles (2.4 million kilometres) of northern Canada, the project described seasonal hunting, fishing, and trapping activities of Inuit living in the Canadian Arctic. The project covered three periods: prior to the arrival of traders, the fur trade years, and the years marked by permanent settlement (i.e., from the nineteenth century to the mid-1970s). The testimony of community member Bill Goose at the Mackenzie Valley Pipeline Inquiry hearings in Ulukhaktok illustrates the powerful implications of mapping indigenous human ecological relations.

> I believe I.T.C.… [made a] presentation to the government on the land claims proposal, and it's going to take some time before things start to happen, and this pipeline, I don't know when it's going to take place but my concern is that I'd like to see the land claim settlement first happening before the pipeline (Mackenzie Valley Pipeline Inquiry 1976: 4014).

These cartographic illustrations of Inuit human ecology, combined with oral testimony, contributed to the negotiation and successful ratification of the Inuvialuit (1984) and Nunavut Comprehensive Land Claim Agreements (1993) and the creation of a new territory, Nunavut (1999). Articulation of Inuit human ecology in the form of maps shows their knowledge, values, beliefs, and perceptions about the land and sea (Kassam and Maher 2000). This case exemplifies the significance of human ecology to issues of indigenous rights and land claims, thereby reiterating both the communicative and transformative capacity of human ecological maps.

6.4.3. Mackenzie Valley Pipeline Inquiry

Human ecology in the Canadian north is primarily related to two conflicting perceptions of the environment: first, a largely southern Canadian point of view of the north as a 'frontier' ripe for resource exploitation; and second, a principally northern Canadian perspective of the Arctic and sub-Arctic as a 'homeland.' The former is characteristic of instrumental connectivity with the land and sea, whilst the latter is characteristic of complex connectivity. The frontier outlook advances the nature-culture dichotomy through

a mental construction of the environment, whilst the homeland perception is engaging taking a view not *of* but *in* the local ecology.

In 1977, a year after the three-volume work of the Inuit Land Use and Occupancy Project was published, the report of the Mackenzie Valley Pipeline Inquiry, entitled *Northern Frontier, Northern Homeland*, was released (Berger 1977). In addition to gathering testimony from 300 experts, Justice Berger carried out hearings in 35 northern communities listening to evidence from approximately 1,000 northerners. The contents of this report and its recommendations were of historic significance to northern Canadian human ecology. The knowledge of, and concern for, their ecosystem were effectively communicated by the indigenous peoples. For instance, at the Mackenzie Valley Pipeline Inquiry hearings in Ulukhaktok, John Kuneyuna describes the objectives of mapping Inuit Human Ecology:

> I.T.C. was telling us how to mark our land how we used it, they wanted us to mark even the ocean, how much of the ocean we used and how much of the land we used. That's the reason why I am saying this, because if the two holes that they are planning to drill in Tuk [Tuktoyuktuk a community across the Beaufort sea from Ulukhaktok], it might be the place where the people are mainly hunting for bears or seals.… if an oil spill occurs then what will happen is the livelihood of Tuk is going to be spoiled because if that oil spill is running loose and it's not controlled, well the whales are the main resource for Tuk, and seals, and the whales might move to some other areas and it wouldn't be good because Tuk would be out of whales and seals (Mackenzie Valley Pipeline Inquiry 1976: 4016–4017).

The report, authored by Justice Berger, provided extensive evidence of the pattern of land and marine resource use by the Dene, Metis, and Inuit peoples of the Mackenzie Valley. It described the potential impacts that a proposed pipeline down the Mackenzie Valley would have on the way of life of these indigenous communities. As with the Land Use and Occupancy Project, maps and oral testimonies were used to document the human ecology of the Dene, Metis, and Inuit peoples. The struggle to define the

Canadian north of the 1970s as either a 'frontier' open for resource exploitation or a 'homeland' in which indigenous communities have clear and historic relations with the land and sea was decided by the Berger Inquiry. A ten-year moratorium was placed on the pipeline so that indigenous communities could increasingly participate in decisions that would affect their ecosystem (Kassam and Maher 2000). In the early part of the twenty-first century, American and Canadian corporations are engaging in a discussion for a pipeline to be built as several indigenous land claims have been settled and indigenous communities are also seeking to make investments in non-renewable resource development to generate employment for a burgeoning and youthful aboriginal population. Ecological relationships of indigenous Arctic communities to their habitat, like indigenous knowledge, are not static, but constantly being transformed while maintaining their essential connection to the land. The next few decades will be challenging for sustaining biological and cultural diversity in the circumpolar Arctic and sub-Arctic because the north is on the verge of a new era of southern-driven resource exploitation that will change indigenous human ecological relations.

6.4.4. Arctic Institute of North America

Starting in the early 1990s, the Arctic Institute of North America at the University of Calgary began to undertake a number of what it called "traditional land use and occupancy studies" throughout northern Alberta. These studies were undertaken within a number of complex contexts that have included staple resource development (timber, mining, oil, and gas), defining indigenous common property rights, and resource management and development in partnership with private interests. Using participatory approaches to research, overlays of indigenous land use and occupancy were combined with topographic maps to assist in decisions about resource conservation, land use planning, and industrial development (Robinson, Garvin, and Hodgson 1994).

Maps documenting indigenous resource use were completed, with the following communities of northern Alberta as research partners: Anzac, Janvier, and Conklin (Robinson, Garvin, and Hodgson 1994); Fort McKay (Fort McKay First Nations 1994); Dene Tha' (Dene Tha Nation 1997); and

Kituskeenow (Bigstone Cree Nation and Metis People of Kituskeenow 1999).

6.4.5. Double Loop Learning – Transformation in Power Relations

A profoundly significant change occurred in the relation of power between the maps drawn by Matonabbee (and other Chipewyan) for the Hudson's Bay Company, Iligliuk's map for Captain Parry, Ikmallik's map for Captain Ross, and Pakkak's map for Franz Boas, on the one hand; and the maps prepared by the Inuit for their own rights in the Land Use Occupancy Project and the indigenous communities in the Canadian north at the Mackenzie Valley Pipeline Inquiry, on the other. Despite colonization, there is no proof of intellectual superiority on the part of the European explorer-geographers over the indigenous map makers. Both had cartographic skills, as the explorer journals attest. If anything, the indigenous peoples were more knowledgeable about their geographic and human ecological context than the visiting and ultimately conquering Europeans (Rundstrom 1990).

What is it, then, that made the Europeans difficult to resist? To the indigenous cartographer the map was simply a guide for the Europeans. Boas (1964) explains how the Inuit draw maps in the snow to guide. After a snowfall or a gust of wind these maps are erased only to be redrawn again when someone else needs information to get to a particular place. To the Europeans that map was more. It was a means to prove something – to prove the path to the Northwest Passage, to show proof of imagined riches located in a distant land. As Brody (2000) would argue, the map helped fulfill the "curse of genesis" by facilitating the expansionary propensity of European societies with agricultural roots. They took these maps and transported them home to convince others. The maps would validate their claim to existence and possession. As noted in chapter 5, in the scientific and technological enterprise validity is determined by a community of experts. Bruno Latour (1986: 5) explains that in an "agonistic" encounter in scientific claims, doubt is diminished by being able "to muster on the spot the largest number of well aligned and faithful allies." "Thus, the history of science is in large part the history of the mobilization of anything that can be made to move and shipped back home for this universal census" (Latour 1987: 225). Maps furthered these ends and ultimately the process

of conquest, settlement, and displacement of Aboriginal rights to facilitate resource extraction. Again, the Europeans did not possess any particular superiority, as adequately displayed in what would otherwise would have been a comical farce if were not for the tragic end to Sir John Franklin and his men in his third expedition (Wiebe 2003). Compared to the English, the Inuit had developed superb technology for their environment such as clothing, building shelter, hunting, finding each other in the snow and ice, and travelling the tundra in darkness. The British among the Europeans seemed to have a particular penchant for making martyrs of "those who get killed and take a lot of lives with them through their wilful stupidity" (Wiebe 2003: 43).

What was different was that the European powers like the British and French were compiling maps from all over the world, collecting information from different regions so as to achieve aims like conquest, economic domination, and resource extraction. This knowledge was being transported from its point of generation, centralized, and combined with other knowledge from other locations. The sheer magnitude of the scale of operation and the values that engineered it made the colonial project different – it had nothing to do with intellectual prowess as such. The maps fed the appetite generated by the administrative complexity of the colonial enterprise. Transportation technology and the printing press facilitated empire (Innis 1973; 1995). Furthermore, the ability to print and publish enabled growing support for one's claim among a community of 'experts' (Latour 1986; 1987). The visualization of geographic knowledge had more convincing power. The cost to objecting to these claims would be high because it would demand printing and distribution of counter-claims. The link between 'manifest destiny' and claim of 'empty lands' was facilitated by maps drawn from an instrumentalist perspective to achieve colonial aims. Even the fiction of 'empty lands' could be accepted as fact if enough 'experts' in a distant land agreed in the court of some European monarch that it was true.

Latour (1986: 20–22; 1987: 215–57) describes nine attributes that enable "two-dimensional inscriptions" like maps to gather support for claims to validity:

1. These maps are *mobile*;
2. Once drawn these maps are *stable* (do not disintegrate while being transported);
3. The maps are *flat* and therefore easy to *dominate*;
4. Their *scale* can be *modified* at will;
5. Maps can be *reproduced* en masse;
6. The maps can be *recombined* while maintaining optical consistency;
7. It is possible to *superimpose* images of different scales and origins;
8. Maps can be *made part of a written text*; and
9. The two-dimensional aspects of the maps can merge *with geometry*.

These qualities give advantage those who control the technology to transport, print, publish and distribute this type of visualized knowledge.

To achieve this consensus among a community of experts, the explorers had to establish "commensurability" with indigenous knowledge of the land and sea from the Arctic. Michael Bravo (1996) explains that early encounters in mapping by explorers built commensurability, cross-cultural communication that speaks to the "veracity" of information, that is, validity on the basis of European cartographic standards of measurement. However, since communication is inherently participatory, one can argue that the mapping encounters also informed the Inuit about the relational power of maps.

What facilitated the shift in power relations in the Inuit Land Use Occupancy Project and the Mackenzie Valley Pipeline Inquiry? First, the Inuit realized the potential power of the visual to transform perception by superimposing their human ecology onto topographical maps that otherwise showed 'empty spaces' for resource extraction. The Inuit Tapirisat of Canada in 1973, using the skills of a number of academics, in an act of strategic brilliance and humanistic foresight, proposed and succeeded not only in convincing the government of Canada to support a massive study to document (both text and maps) Inuit land use and occupancy, but more importantly in printing, publishing, and distributing this information. This knowledge thus became mobile and part of the archive of the central government as well as other centres like the university library (Milton Freeman Research Limited 1976a).

The second, most important act was on the issue of validity. The fact that Justice Berger in the Mackenzie Valley pipeline Inquiry did not primarily rely on the testimony of experts from the government, private sector, and environmental organizations is key. Validity was not based solely on the testimony of *communities of inquirers* (knowing *that*), but *communities of social practice* (knowing *how*). Profoundly telling examples of this are to be found in the transcripts of community hearings, which were also documented, printed, published, archived, and now, even distributed on the internet. For instance, the hearing at the community of Ulukhaktok is revealing when Justice Burger is presented with testimony from Inuit hunters attesting not only to sightings of, but actually hunting and showing the exact position on topographical maps of, beluga whales. Testimony from Inuit hunters maintained that the "white" whale is indeed found as far north as Victoria Island despite 'scientific' and 'expert' testimony to the contrary (Mackenzie Valley Pipeline Inquiry 1976: 3943–3944, 3959–3960). In short, the Canadian government, through both visual and textual documentation from the Inquiry, established precedence for validity based on *communities of social practice* or knowing *how*. This ushered in a fundamental shift in the relation of knowledge and power.

6.5. Action Research and Community Participation in Mapping Human Ecology

Mapping that negotiates validity on the basis of *communities of social practice* as well as *communities of inquirers* results in an expression of the relational nature of knowledge and power from a human ecological perspective. David Turnbull, in his *Masons, Tricksters And Cartographers*, describes knowledge as an assemblage, a motley, a patching of the local (2000: 4). In an effort to preserve both biological and cultural diversity, Turnbull makes a case for a third interstitial space – the human ecological map. Its space bridges the field sciences and indigenous ways of knowing. Human ecological maps (1) mediate symbols and facilitate communication across cultures, (2) encourage a double hermeneutic to generate human agency by transforming perspectives, and (3) transfer of practical wisdom (*phronesis*) intergenerationally. Examples of recent human ecological knowledge, detailed below, are particularly noteworthy for their practical use to communities through applied research.

Human ecological research combines mapping with interviews to enable simultaneous validation and robust research results. There is a range of benefits associated with using this participatory approach in research. First, it removes control from the outside 'expert' and places it within the community members' knowledge based on social practice. The researcher acts as a catalyst to begin the process and then steps back to let the community members participate. Second, there is room for a diversity of views and overlapping of ideas as different aspects of human ecological relations are brought to light. Third, the maps are portable and may be taken to various locations in a community for discussion in small groups or to the homes of elderly community members and returned with detailed and specific information. Fourth, it enables validation and cross-checking of information (Chambers 1997; Kassam and the Wainwright Traditional Council 2001).

6.5.1. Mediating Symbols and Communicative Role

A human ecological map is discursive, using its own mediating symbols to communicate. For instance, the maps and descriptions depicting human-land relationships (i.e., the human ecology) for the community of Ulukhaktok, an

Inuit marine community on Victoria Island, employed symbols of animals and plants that were designed by a local artist and accepted by the community partner, the Ulukhaktok Hunters and Trappers Committee. As noted in chapter 4, the objective of the research in Ulukhaktok was to examine human ecological relations and the impact of chemical pollutants. Having agreed upon what constituted an appropriate symbolic representation or icon for a bearded seal, caribou, snowy owl, Arctic char, blueberry, and so on, consensus developed on the symbols to be used in the mapping process and, hence, the categories of information that would be represented on the map. During the process of design, Peter Palvik, the community member and artist who developed the icons, was not familiar with the appearance of several plants used within the community as women traditionally collected these plants. Winnie Akhiatak, a community member participating in the research project, collected the plants so that Peter could design representations for them as icons (see figure 6.2). In the research process, the placing of icons on the map coincided with oral descriptions of harvest and use of animal, plant, and other land and marine resources as well as narratives and oral histories from the community members (see chapter 4).

In Ulukhaktok, as in each community, meticulous attention was paid to the design of appropriate representational symbols and consensus building in order to establish a common vocabulary that may be used and understood by all partners in the project. As a first step, the researchers (*community of inquirers*) and local knowledge holders (*community of social practice*) agreed upon Inuit, scientific, and common names of plants and animals that corresponded to the icons representing plants animals harvested within the community. This created a basis from which the *community of inquirers* could apply their knowledge and experience to explain the significance and importance of the research, and describe complex notions such as bio-accumulation of pollutants in specific animals and plants. Such discussion and dialogue between scientists and community members established the basis – the terms of reference – for collecting, testing and analyzing samples. Community members then undertook the collection of samples, knowing precisely what species and specific parts of plants and animals are required by the scientists. Having collected and analyzed these samples, the scientists were then able to communicate the results back to the community. To-

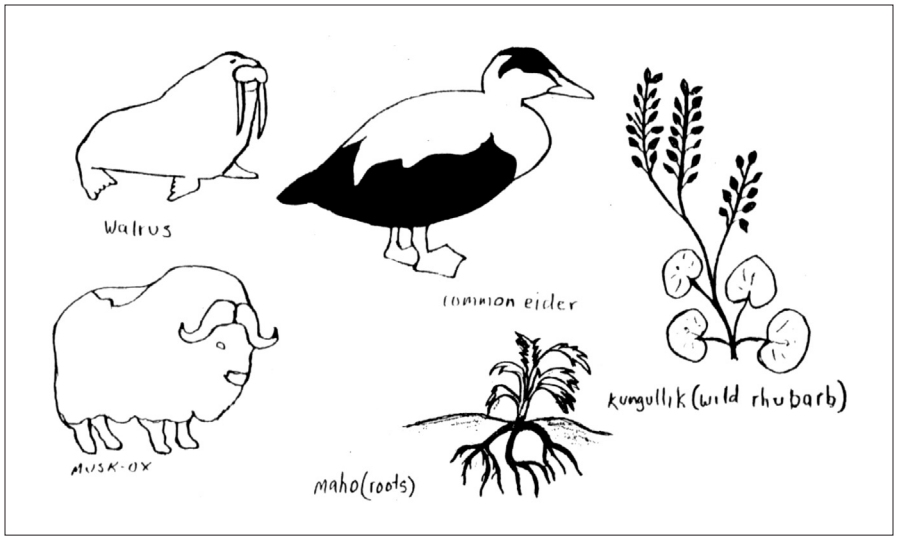

Figure 6.2: Icon Design, a Step in the Communicative Power of Human Ecological Maps.

gether, both the *communities of inquirers* and *communities of social practice* then applied the knowledge they had collectively assembled. The consensus facilitated communication between community members, between the research team and the community, and ultimately with outside resource users. The aim of constructing a human ecological map is not simply to create a shared metaphor that combines systems of indigenous knowledge with applied sciences, but also to correlate these signs and symbols in order to convey this knowledge to a wider audience of policy makers.

The need for symbols to be context-specific because they represent objects beyond their physical attributes becomes even more significant when a map overtly seeks to transform the user's perspective. Symbols simultaneously mediate the experience of the map maker as well as that of the user. In human ecological research, the community is both the maker and first user of the map, modifying and applying the collected knowledge. Then outside users such as policy makers and resource developers such as mining or oil and gas companies also view this knowledge. For instance, when undertaking human ecological mapping in Ulukhaktok, Northwest Territories,

Canada; Wainwright, Alaska, USA; and Novoe Chaplino, Chukotka Peninsula, Russia, there was some disagreement on the symbol for the wolf. The Yupik representative from Novoe Chaplino maintained that the existing symbol for the wolf looked more like a fox and did not represent the "strength" of the wolf. The icon had to be redesigned so that there could be agreement among all three communities. Similarly, during design phase for mapping Kola Sami reindeer herding and other land use, the symbol proposed for grave sites (⛦) by the research team was rejected by Sami representatives. Instead they argued this symbol represented a church. In turn, they proposed what looked like a roof on a grave (⛫). Our proposal was based on our experience of mapping in Canada, where indigenous communities were influenced by Catholic or Protestant Christianity. Hence, the cross (†). The Sami were influenced by Orthodox Christianity. Hence, a cross representative of that tradition (☦). In other words, the signs on a map are based on social assumptions which require that the symbols on the map are not only situated where they are supposed to be, but are also situational to their cultural milieu.

6.5.2. The Double Hermeneutic and Human Agency

The communicative nature of the human ecological map arises from the motives of its makers and their desire to gain agency. In a collaborative project on the Kola Peninsula, Russia, the Sami, after agreeing upon the design of icons, determined the scale to be applied and geographical area to be covered on a topographical map. Having established the boundary of human ecological use, herders, hunters, and gatherers began indicating reindeer migration patterns, calving areas, harvest sites for various plants and animals, sacred areas, and historical places which were mapped in an effort to introduce co-management of reindeer herding on their traditional lands (Robinson and Kassam 1998). Figure 6.3 illustrates the process of mapping among the Sami in the Kola Peninsula Russia. The mapping process involves an animated discussion and description of the information. The process when it comes together is surprisingly enjoyable and exciting to community members and researchers alike. The power of a visual illustration of an assemblage of knowledge from genesis to completion cannot be underestimated as a form of empowerment.

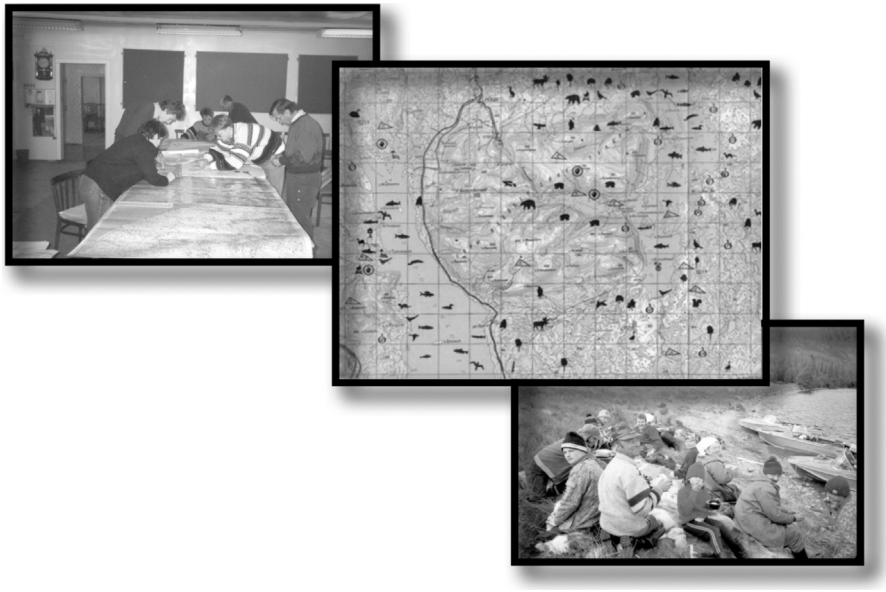

Figure 6.3: The Process of Mapping Human Ecology.

For instance, when the Sami land and marine use maps were completed for the region of Lovozero (on the Kola Peninsula), they depicted diverse information such as reindeer herding process according to the seasons; bird, fish, terrestrial and marine mammal harvesting sites; and the location of sacred places. In 1997, the Russian mayor of the town of Lovozero viewed the knowledge of the indigenous Sami peoples – he simultaneously validated (knowing *how*) through his own experiences as a hunter and fisher as well as learning the extent of Sami land use. He was also a critical user of the map (learning *how*). Although he was neither a participant in the production of the maps nor a known proponent of Sami land rights, a few days later in capital of the region, Murmansk, and in the presence of the media, members of the Russian Academy of Sciences, and the Governor, he attested to the authenticity and value of the maps. As such, human ecological maps not only have the ability to transform physical space, but also the user's perspective.

In the spring of 1998, the development of a gold mine in the Voronye Tundra, including a bridge across the Voronye River, was proposed by Voronye Minerals, a joint venture of Swedish mining company Boliden Ltd. and the Administration of the Murmansk County. The effect of the development would have opened up the tundra to widespread access and the mine would have devastated essential reindeer herding grounds. Local Russian, Nenet, and Komi, along with the Sami, protested the bridge and the gold mine development. The human ecological map prepared by the Sami was used to illustrate the potential impacts of the development on the ecology of the region and to the livelihoods of the people of the area. As a result of a campaign undertaken by the local Sami, the participation of the Sami Parliament in Fino-Scandinavia, support from the regional Russian Duma and the Governor of Murmansk, the sponsoring Swedish company withdrew its investment from the development initiative, thus averting an impending environmental catastrophe. Empowered by the strategic application of cartographically represented indigenous knowledge, the Sami are currently utilizing the map to thwart tourism development that excludes their participation in their sacred heartland of *Sedozero*.

The case of the Sami map indicates that the communication of indigenous human ecological knowledge, combined with knowledge derived from the field sciences using the map, can facilitate socio-political empowerment. The human ecological map becomes a source of authority in the process of exerting indigenous rights. However, the map alone is not sufficient. It can serve as a catalyst as long as the indigenous community has the basic organizational infrastructure and institutions that can enable the production of the maps and the realization of its socio-political potential. In the case of the Kola Peninsula, partnership with the local and national Sami associations was essential to the research and construction of the map. This map remains protected in the Lovozero *Dom Cultury* (Cultural Centre) for use by the Sami and local and regional policy makers.

In a similar case, documenting and mapping human ecological relationships of the Iñupiat of Wainwright, Alaska, places knowledge at the community's disposal at a time when corporate and government forces unite to exploit oil reserves in northwest Alaska. While the original intent of the human ecology research has been to trace the impact of chemical pollutants

by marine pathways, the community is also able to use the land and marine use maps to illustrate their traditional rights and the impact of resource development on their subsistence lifestyle. Currently these maps are being used by the community to negotiate the extent of oil drilling rights in the region as a result of the U.S. government's effort to begin oil and gas development in the National Petroleum Reserve on the North Slope of Alaska. In short, human ecological mapping can be a major counter-force to southern cartographic use meant to benefit non-Iñupiat interests.

6.5.3. Intergenerational Transfer of Phronesis

In the long run, the impact of the human ecological maps in the cases we have discussed above will be on intergenerational transfer of knowledge. All of the indigenous communities involved in the research have identified this as an important outcome of their research partnership. For instance, in the Iñupiat community of Wainwright, Alaska, the information derived from the research will be used as teaching material for young Iñupiat students. The president of the Wainwright Traditional Council, June Childress, in her foreword to *Passing On The Knowledge*, the publication containing the research results, notes:

> *Passing On The Knowledge* is a tool for communicating knowledge between generations. I hope that it will create a desire among young people to write down the knowledge they get from their elders. This report is a model that young people can use to write their own family histories. I hope the maps and analysis will be used not only for this research project, but in the schools and by community members as well (Kassam and the Wainwright Traditional Council 2001: ii).

Land and marine use maps provide local people not only access to the knowledge of their ancestors, but also an impetus for a younger generation of indigenous people to interpret and re-interpret this knowledge and to make their own contribution to this growing body of knowledge. Furthermore, the human ecological map is a catalyst for dialogue. Increasingly, children are repositories of the knowledge of their grandparents. For

instance in Lovozero, Russia, the community member who participated in interviewing and constructing the map was also an elementary school teacher. She took drafts of the maps to her class and encouraged the young students to trace regions of the map where their families historically lived and migrated as clan groups. The children took these maps home to their grandparents and returned the next day with more detailed information plotted on the map demonstrating the Sami relationship with their local ecology as well as with narratives of their ancestors. The maps acted as a vehicle for a discussion between the children and their grandparents on their common history, spirituality, and way of life. In effect, the engagement between the two generations integrated indigenous values and the practice of their way of life in the context of human ecological relationships.

6.6. Discussion

Power is relational – it is exercised, not seized. Therefore, power relations are not external to human ecological relations, but embedded within them. The various cases of mapping in this chapter indicate that knowledge and power imply one another. Since power is relational, it is manifested in a context, in the particular, in the concrete action of *living through* the peaks and troughs of existence. The exercise of power, like knowing *how*, is implied in Aristotle's notion of *phronesis* – where the land and sea are not subject to instrumental thinking ripe for resource extraction (*chrematistics*), but valued instead for providing sustainable livelihoods (*oikonomia*). Examples of human ecological maps in this chapter display how these power relations shift from a dominating 'frontier' point of view to a 'homeland' perception. The frontier perspective, reminiscent of instrumental connectivity, is limited in its conception of human ecology because of the nature-culture dichotomy, whereas a homeland perspective, which acknowledges complex connectivity, is empirically demanding and rich in its human ecological relations. How the two ways of knowing co-exist to create a third space for conserving the deep interconnectivity between biological and cultural diversity has been the subject of this chapter.

The human ecological map reclaims the 'other' by displaying indigenous cultural ecological relations on their own terms without loosing the ability to communicate across cultures. It is noteworthy that the domination of the 'other' and acquiring their 'empty lands' required maps to effectively displace indigenous land use from its cultural context. Yet it is also the map, this time produced with the participation of the "other," which reintegrates cultural and ecological relations onto a cartographic context. This type of mapping has opened up a new terrain of power relations in which struggles over resources are linked to issues of cultural diversity and biological diversity. However, human ecological mapping is neither a panacea nor a quick fix with regard to indigenous rights or resource management. With land use and occupancy maps, it still took decades of political negotiations and research for indigenous communities in the Canadian Arctic and sub-Arctic to settle their land claims.

The human ecological map corresponds to an assemblage of both indigenous as well as Western cartographic knowledge – a combination of elements that provide a unique metaphorical representation of knowledge hitherto not revealed. This commensurability enables cross-cultural communication. However, the veracity of the information contained in such maps is derived from *communities of social practice* – those who engage their ecological environment in subsistence activities. This assemblage gains mobility through the map, giving the ability to traverse disciplinary and cultural boundaries. A culture of ethnographic research, documentation, printing, distribution, and archiving generates support for the values of subsistence livelihoods. This, too, is a form of validation. In an academic context, the validation emerges from *communities of inquirers*. As such, the human ecological map negotiates the coexistence of seemingly contradictory forms of authority. The mutual coexistence of differing forms of validity actually represents the transformation from context-dependent knowing *how* to context-independent knowing *that*. Experiential knowledge necessarily depends on *communities of social practice* for its validity, and imparted knowledge, being mobile, depends on validation by *communities of inquirers* who may be elsewhere. Here we are not discussing a divide between science and indigenous knowledge, because both forms of knowledge are context-specific in their generation. Rather we are discussing the

transformation of knowledge in order to communicate and engender a shift in perception and power relations. The shift occurs when reading the map by drawing from its communicative power – learning *how*.

The human ecological map has the potential to generate a double hermeneutic, a reflexivity, the ability in self-reflecting individuals to produce a change in perception. This communicative capacity of the map is illustrated in its ability to realign power and knowledge relationships and to achieve agency for its makers. The Inuit Land Use Occupancy Project, the Mackenzie Valley Pipeline Inquiry, and the Sami maps are clear examples of this. Regions viewed from an instrumental perspective as frontiers valued by outsiders solely for their resources are transformed by the map into thriving biotic systems incorporating human ecological relationships hitherto not considered, but always present. The strength of the map lies in its ability to alter the viewer's perception of the land and sea. The capacity of successful cross-cultural communication to produce change in perception is characterized by the establishment of a common vocabulary of symbols and trust in the veracity of the knowledge generated. The participatory approach is key to facilitating the language of trust. An illustration of this is the example of human ecology research in Ulukhaktok, where a common vocabulary for communication among researchers and community members alike was created. Human ecological mapping is not only a medium for imparting information, but a representation of an indigenous knowledge laid out in a manner so as to transform the understanding of those who use the map. By first establishing commensurability, it challenges their perceptions – speaking at the same time not only to the hunter and the applied scientist but also to the government policy maker and the corporate executive.

The communicative nature of these maps does not suggest that they are always effective in an adversarial context. A human ecological map is very useful but not sufficient to respond to a political authority that is adamant on extraction of natural resources. The map engenders an enabling environment for discussion, but it also requires a commitment, on all sides, to facilitate the discussion. This willingness arises from consensus in civil society as well as policy makers. Civil society is not necessarily strong in all regions of the world. The example of the Mackenzie Valley Pipeline Inquiry in this chapter illustrates how this willingness was given an institutional

framework by including testimony from 35 northern communities and over 1,000 community members. Not all governments are willing to invest time and resources in such a process. For human ecological maps to be effectively utilized, they require political and legal support.

The value of human ecological maps of the Iñupiat community of Wainwright still remains to be discovered. At this time it is unclear if the community will be able to communicate their subsistence land and marine use concerns to corporate interests in the National Petroleum Reserve on the North Slope of Alaska in an effective manner. However, early encounters indicate that when oil companies produce maps of their allotments for exploration and drilling, the community leaders also pull out human ecological maps for Wainwright. Concrete evidence of sensitivity on the part of government agents and corporate representatives to Iñupiat concerns still remains to be seen.

The human ecological map does not undo a history of alienation or quickly resolve complex issues related to sustainable livelihoods, resource extraction, and conservation of biological and cultural diversity. It provides a common vocabulary for engagement. Complex issues cannot be mapped but can be approached using a human ecological map. A map ultimately only captures one portion of a wider narrative of bio-cultural relations.

It is important to be aware that some cognitive categories will not be commensurable or translatable because they are not interchangeable units. As well, a community might choose not to map certain information, for instance, on sacred places, in order to protect it from political and economic calculus.

Human ecological maps have the potential of becoming independent of their creators. This is an area of deep concern. In the process of mapping human ecological relations, the goal of holism may be compromised because the map simplifies, aggregates, and demarcates. This may lead to ignoring valuable details and nuances associated with diverse land and marine uses. Excessive generalization in maps may lead to homogenization of diversity, making it vacant of meaning and divorcing it from the human ecological relations that produced it, thus becoming an artefact of those who know *that* rather than expressing the experiences of those who know *how*. To mitigate this, the map must be contextualized by the testimony of

its producers in order to remain close to knowing *how*. Again, the human ecological map must be contextualized by the visual and the verbal testimony of its creators.

The process of human ecological mapping may co-opted and bounded by simplistic notions of community to serve only one group's interest, further marginalizing the disadvantaged in a community. For instance, the interests, priorities, and claims of women or vulnerable groups within a community may be ignored, ultimately to the peril of not only the process but the community as a whole. Human ecological mapping requires researchers to be consistently attentive to whose interests are being served.

The cartographic venture has a tendency towards over-reliance on discrete boundaries. The map is not a neutral tool: a community maps its biocultural relations within bounded space; and the map in turn also defines the community and its space. Often there may be overlapping claims over territories by various indigenous communities which will require negotiation and resolution.

The horizontal ability of human ecological maps to reach across cultures within a specific historical time frame is matched by a vertical tendency that allows the map to communicate or engage across generations within the same culture with different historical experiences. The map may simultaneously reflect the past, present, and potential land and marine use. It creates an enabling platform from which a young indigenous person can conceptualize *living through* the land and sea in a language that is relevant to her or his context.

Indigenous human ecological maps are the 'third space' which expresses the deep interconnectivity between biological and cultural diversity. Such maps create a shared space for different knowledge systems to work together. Diversity cannot be conserved if only one way of knowing dominates. However, with human ecological mapping, different knowledge traditions are able to work together for the benefit of understanding the relationships between biological and cultural diversity.