

TRADITIONAL ECOLOGICAL KNOWLEDGE  
AND  
ENVIRONMENTAL IMPACT ASSESSMENT

Barry Sadler  
and  
Peter Boothroyd  
editors

May 1994

## TABLE OF CONTENTS

CHAPTER	PAGE
<b>1. Back to the Future: Traditional Ecological Knowledge and Modern Environmental Assessment</b> <b>Barry Sadler and Peter Boothroyd</b> Frame of Reference, by Barry Sadler The Approach Taken, by Peter Boothroyd	 1 2
<b>2. Traditional Ecological Knowledge and Environmental Impact Assessment</b> <b>Dene Cultural Institute</b> Western Scientific Recognition of Traditional Ecological Knowledge The Nature and Transmission of Traditional Ecological Knowledge Methods used to Document Traditional Ecological Knowledge Examples of the Application of Traditional Ecological Knowledge to Environmental Assessment and Management Discussion and Conclusion	 5 5 7 12 14 15
<b>3. A Community-based Conservation Strategy for the Bowhead Whale</b> <b>K.J. Finley</b> Background Project Approach Review and Discussion	 21 21 22 28
<b>4. Community Impact Assessment and Old Crow, Yukon</b> <b>Nancy MacPherson and Gladys Netro</b> The Community of Old Crow Impact Assessment and the Community of Old Crow Conventional Impact Assessment Old Crow's Approach to Impact Assessment Project-Specific Impact Assessment The Importance of Conceptual Level of Impact Assessment	 31 31 32 34 35 39 40
<b>5. Ehattesaht Traditional Fisheries Systems</b> <b>P. Berringer, W. Green and V. Smith</b> Study Methods and Area Community Knowledge of Traditional Fisheries Systems Relevance and Relationship of Traditional Approaches to Modern Day Systems of Fisheries Management Impact Assessment Recommendations	 41 41 41 44 49
<b>6. Where do we go from here? The Future of Traditional Ecological Knowledge and Resource Management in Native Communities</b> <b>E. Pinkerton</b> Loss of Traditional Knowledge and Traditional Management Regimes, Crisis and Challenge Developing Co-Management Regimes Conclusions and Directions for Future Research	 51 51 53 56

**TABLE OF CONTENTS**  
**(continued)**

<b>CHAPTER</b>	<b>PAGE</b>
<b>7. A Research Preliminary Prospectus</b>	
<b>Assembly of First Nations and Inuit Circumpolar Conference</b>	<b>61</b>
Assembly of First Nations' Findings	61
Inuit Circumpolar Conference Findings	62
Research Agenda	62
Appendix 1. Incorporating Traditional Knowledge into Environmental Assessment: Barriers and Solutions	63
Appendix II. References and Information Sources	65
<b>8. Guidelines for the Conduct of Participatory Community Research</b>	
<b>Dene Cultural Institute</b>	<b>69</b>
Establishing Cooperative Ventures: The Development Process	69
Developing the Research Methodology	71
Appendix I. List of Contributors to Guidelines Document	74

# 1. BACK TO THE FUTURE: TRADITIONAL ECOLOGICAL KNOWLEDGE AND MODERN ENVIRONMENTAL ASSESSMENT

**Barry Sadler and Peter Boothroyd**

## A FRAME OF REFERENCE

**Barry Sadler**

*The Earth is the foundation of Indigenous Peoples. It is the well of their spirituality, knowledge, languages and cultures... The Earth is their historian, the cradle of their ancestors' bones, it provides them with nourishment, medicine and comfort...*

From: Recommendation No. 1, Workshop 13,  
Conference on Implementing the  
World Conservation Strategy,  
Ottawa, Canada, May 31 - June 5, 1986

Here is compelling testimony of the relationship that indigenous peoples have with the living Earth. Theirs is a seamless view of the natural world and humanity's place in the scheme of things. It is an inherently ecological perspective, but one which includes, rather than excludes, people in the web of life. Native peoples also take a long view -- looking seven generations forward and drawing on a millennia of experience -- when making decisions. Traditional ecological knowledge, the accumulated wisdom of native communities about natural processes, provides a guidepost and a touchstone to their everyday resource use and management practices.

The search for a sustainable society is a catalyst for rethinking the relationship of traditional ecological knowledge (TEK) and modern resource science in the form of environmental assessment (EA). It is an opportunity to go "back to the future." We should do so for at least two reasons. First and foremost, the retention and use of traditional ecological knowledge plays an important role in reinforcing the identity of indigenous peoples and their attempts to realise appropriate paths of development. This intercultural perspective seems reasonably clear and well acknowledged (Colorado 1988). Secondly, there is much that western science can learn from traditional ecological knowledge frameworks and sources. This inter-scientific perspective, likely, is less widely endorsed, more contested by the mainstream of resource managers and environmental analysts (Usher 1987).

Because of this view, perhaps, relatively few attempts have been made, to date, to systematically integrate traditional ecological knowledge and modern environmental assessment. This is the focus for the present volume of studies commissioned by the Canadian Environmental Assessment Research Council (CEARC). In initiating this project, the

Council had the following working objectives:

- to demonstrate the application of traditional ecological knowledge in community decision making; and
- to improve the effectiveness of EA processes in incorporating the views of native people.

A short introduction to the wider theme and approach is given in this chapter.

From the beginning, the TEK Project was seen as adding a new dimension to the Council's programme on EA decision concepts and instruments for sustainable development. Global environmental changes, alluded to previously, are driving a reappraisal of existing patterns of development and the ideologies and processes of analysis and choice that underlie them. The theme of sustainability, at base, emphasises the importance of a holistic approach to development decision making, one which encompasses a commonwealth of ecological, social and economic values and employs a collaborative, consensus-seeking style.

Native peoples and others familiar with their culture will recognise that this "new model" is, in fact, a very old one. Its main elements correspond with the world view and community traditions of Inuit and Indian. Their relationship to land and resources is both direct and spiritual, central to their identity, culture and well being (see Keith and Simon 1988). By contrast, that of modern urban industrial society is more attenuated and dichotomous, insulated by a science and technology which encourages the separation of society, economy and the environment as discrete entities and taxa of analysis. The task of reintegrating these components in assessment, planning and decision making for sustainable development can draw on the values and experience of indigenous peoples.

For too long, there has been a wide and seemingly unbridgeable gulf between western science and indigenous knowledge. With few exceptions, institutionalised systems of resource and environmental management have been founded on technical and professional disciplines that strive for rigour, objectivity and value neutrality. Nothing wrong with that, provided the approach is tempered by recognition of its limitations and is rounded by ethics, including respect for other knowledge and value systems. This is not necessarily the case, however. In the closing years of the twentieth century, the conventional paradigms of modern science and technology are being circumscribed by their own contradictions. Human activity, for the first time, is affecting natural cycles and

systems on a truly global scale, and the impacts are beyond the reach of our capabilities to either accurately predict or effectively control (Sadler and Jacobs 1990).

In this context, the value and utility of traditional ecological knowledge is a microcosm of the larger whole. This form of knowledge, often stored only in the memory of elders, is learned through a millennia of observation, trial and error. Over thousands of years, the indigenous peoples of the land we now call Canada have acquired an encyclopedic understanding of the rhythm of the land, its natural cycles and processes, and the relationship of plants and animals. So they became, in the words of Virginia Smarch, a Yukon Indian, *part of the land, part of the water* (McClellan 1987). This intimate adaptation to the environment is based on management practices that are more specialised and sophisticated than many resource scientists are prepared to credit. After all, they have stood the test of time in regions where the margins for error were narrow and the price of failure was high (Sadler 1990).

During the last 10,000 years, major changes in climate, flora and fauna have occurred in traditional areas of Inuit and Indian occupancy. They are still here; but now so are we. For the native peoples of Canada, the course of European settlement is the history of land dispossession. Land claims negotiations and entitlement, alone, may not be enough to guarantee the maintenance of indigenous cultures and the knowledge on which they are based. The character and pace of modern technological development works to undermine these traditions (Brody 1981).

A wedge is being driven between the young and old, between those plugged into the urban-industrial world through education and media and those who pursue the old ways. This is fracturing the oral tradition of passing from generation to generation the storehouse of ecological knowledge that is necessary for fishing, hunting and gathering. For indigenous peoples, of course, the value of this wisdom extends well beyond subsistence. It is integral to their cultural survival, supporting their religion, medicine and community. All of these elements are bound together, interrelated in a non-compartmentalised world view.

This seamless relationship was exemplified in a companion CEARC project on Human Health and Environmental Impact Assessment (O'Neil and Solway 1990). At a northern workshop, indigenous participants repeatedly emphasised that "when the land is sick so are we." When they return to summer camp "nutrition, the socialisation of children, personal identity and self-esteem all improve." Native peoples do not separate the spiritual, physical and socio-psychological relationships. Ecological and community health become one and the same.

Many sectors of western society find this notion hard to grasp, though it yet may come to haunt our technological and

material world view. For loss of traditional ecological knowledge is a world wide phenomenon that carries profound consequences. The cover story of a recent issue of Time magazine, for example, focused on the pervasive disappearance of native cultures, and the irreplaceable repository of scientific and medical wisdom that is lost with them (Linden 1991). Unless steps are taken to retain these cultures, most of the remaining memory archives could be gone within the next generation. As the World Commission on Environment and Development (1987: 115) noted: *it is a terrible irony that as formal development reaches more deeply in rain forests, deserts, and other isolated environments, it tends to destroy the only cultures that have proved able to thrive in these environments.* We are all the poorer in terms of cultural and biological diversity.

An overriding concern of native communities is how to protect and maintain their traditional knowledge as a living science. To that end, we need a better understanding of the processes by which this is acquired, transmitted and utilised. This serves as a wider frame of reference for the studies in this volume. It should repay our attention in terms of improved linkages between western science and traditional knowledge in environmental assessment and decision making affecting native peoples. Equally important, we may learn something about the limitations and filters on conventional EA practice, and so confront the paradox of a science of sustainability being built on ever-increasing specialisations.

## THE APPROACH TAKEN

### Peter Boothroyd

The studies in this volume focus on the historic, contemporary and potential applications to EA of indigenous peoples' traditional knowledge. The EA practices considered include both project-specific impact assessment and environmental assessment as a component of resource management and planning.

Three case studies were conducted in close consultation with members of a specific aboriginal community. These case studies were: the documentation of Bowhead whale management practices in the Clyde River region of Baffin Island; the community-based evaluation of the impact statements produced by proponents of pipelines planned to cut across the Yukon North Slope territory of the Old Crow people; and the study of the management system of the Ehattesaht tribe on west Vancouver Island.

Two other studies provide complementary overviews of the field. The Dene Cultural Institute of Yellowknife contrasts traditional and scientific ecological knowledge, identifies methods for documenting the former, and discusses its applications to environmental assessment in terms of monitoring, land use planning, and project assessment. Evelyn Pinkerton, an authority on resource co-management, draws on a diverse literature in addition to the other chapters of this

volume to establish the claim that traditional knowledge can contribute not only to aboriginal self-management but also to management regimes involving the state. She specifies resource management functions that can be enhanced by traditional knowledge: enforcement, comprehensive planning, data collection and analysis, harvest regulation, enhancement, and allocation.

This perspective is consolidated and extended in the last two chapters, which comprise a research agenda for traditional ecological knowledge and environmental assessment and guidelines for the conduct of participatory research in native communities. Both reports were prepared by native organisations and reflect their concerns and interests, and attempt to redress the imbalance between native and non-native research.

Collectively, the studies show that traditionally aboriginal peoples' knowledge has been effectively applied to what we now call environmental assessment in all aspects of resource management and that this knowledge now has the potential to contribute significantly to contemporary management practices. The studies exemplify that both in traditional and modern contexts the strength of the aboriginal perspective on environmental assessment lies in its holism.

Traditionally, the aboriginal perspective was holistic because environmental assessment was an integral part of daily life. It was a feedback loop by which people observed the consequences of past and present action and considered the likely impacts of future action. The process was integrated with the cultural life of the community, as the studies in this volume concretely illustrate. Environmental assessment was practised directly and continuously by those who simultaneously harvested, managed and controlled the resources. The knowledge generated by environmental assessment was produced, refined, stored, disseminated and used by a rich system of testing, observing, theorizing and communication involving complex social structures, information networks, and rituals.

In contrast, the hallmark of modern society is its specialization. Research, planning, decision-making, regulation, management, building, harvesting and monitoring tend to be seen as mutually exclusive roles. Except at the most menial levels, these roles also are seen as requiring more sophisticated skills and perspectives than most people possess. The roles, therefore, are played by people who assume sophistication on the basis of power derived from academic credentials, money or political office.

Not only is there role specialization among the powerful. Within each type of role, there is refined specialization. Power and knowledge divide as the increase. It is, in fact, this specialization which is the *raison d'être* for impact assessment. As specialized technical knowledge and power to modify

natural systems has increased, it has been seen necessary to develop countervailing specialties for assessing development proposals and managing resources.

However, there has been a growing awareness on the part of communities and many impact assessors that specialization cannot by itself solve the problems created by specialized technocratic power. Increasing refinement of assessment research and approvals procedures without provision for integration of knowledge and power at the most local levels exacerbates not only alienation but also inefficiency and confusion. When centralization and specialization feed each other and on themselves, they contribute to the very chaos and uncertainty they are trying to overcome.

The holism of traditional knowledge can be an antidote to the excesses of modern specialization. Applied to environmental assessment in the ways discussed in the chapters of this volume, traditional knowledge can balance western science, turning it from an inhuman force often hostile to spiritual and social development to a benign force serving the ends of healthy human ecology. Awareness of traditional knowledge increases respect for the contributions to be made by all people, improves communication among diverse interests, and enhances abilities to predict and monitor ecological and social impacts.

The studies presented here, therefore, should be of interest to practitioners, theorists and students of environmental assessment who seek to deepen their understanding of the field.

## REFERENCES

- Brody, H. 1981. *Maps and Dreams*. Toronto: Douglas and McIntyre.
- Colorado, P. 1988. Bridging native and western science. *Convergence*, 21, No. 2/3: 49-68.
- Linden, E. 1991. Lost tribes, lost knowledge. *Time*, 138, No. 12: 44-56.
- McClellan, V. 1987. *Part of the Land; Part of the Water*. Toronto: Douglas and McIntyre.
- Keith, R.F. and M. Simon. 1988. Sustainable development in the northern circumpolar world. In P. Jacobs and D. Munro (eds.). *Conservation Equity: Strategies for Sustainable Development*. Cambridge: Cambridge University Press, 209-225.
- O'Neil, J.D. and J. Solway. 1990. *Human Health and Environmental Assessment in the North*. Background Paper and Workshop Report. Ottawa: Canadian Environmental Assessment Research Council.

Sadler, B. 1990. Sustainable development, northern realities and the design and implementation of conservation strategies. In E. Smith (ed.). *Sustainable Development Through Northern Conservation Strategies*. Calgary : University of Calgary Press, ix-xxvii.

Sadler, B. and P. Jacobs. 1990. A key to tomorrow: on the relationship of environmental assessment and sustainable development. In P. Jacobs and B. Sadler (eds.). *Sustainable Development and Environmental Assessment: Perspectives on Planning for a Common Future*. Ottawa: Canadian Environmental Assessment Research Council, 3-3 1.

Usher, P.J. 1987. Indigenous management systems and the conservation of wildlife in the Canadian North. *Alternatives*, 14, 1: 3-9.

World Commission on Environment and Development. 1987. *Our Common Future*. New York: Oxford University Press.

## 2. TRADITIONAL ECOLOGICAL KNOWLEDGE AND ENVIRONMENTAL ASSESSMENT

### Dene Cultural Institute

For thousands of years, aboriginal peoples around the world have exploited the natural resources of their local environment in an ecologically sustainable manner. Only recently, has this knowledge, built up over generations of careful observation and experience, begun to be recognized among the western scientific community as a valuable source of ecological information. Various labels such as folk or ethno-ecology, traditional environmental/ecological knowledge or customary law, a growing body of literature attests not only to the presence of a vast reservoir of information regarding plant and animal behaviour, but also to the existence of effective indigenous systems of self-management which rely upon a sophisticated data base to determine strategies for conserving natural resources.

The purpose of this paper is to provide an overview of traditional ecological knowledge (TEK) field of study. Also identified are some of the major methodological, environmental, political and socio-cultural issues arising from efforts to document TEK, and to integrate it with scientific environmental assessment and management. The information presented is drawn primarily from a literature search, although it is by no means exhaustive. It must be stressed that, of the limited attempts to date to integrate traditional knowledge into the environmental assessment and management processes, few results have been published in reports, and most efforts have not been subjected to a formal evaluation. Thus, many of the issues raised in this paper are based solely upon the personal opinions of a limited number of persons interviewed during the course of the study. Although some general references are made to the work of international agencies and to specific research projects occurring outside of Canada, the primary focus of the review is northern Canada which clearly stands at the forefront of research about traditional knowledge.

The paper begins with an overview of the development of western scientific interest in traditional ecological knowledge. Reference is made to the issues that have been addressed by individual scholars and a number of national and international organizations holding an interest in the subject. The second section explains the nature and transmission of traditional ecological knowledge and compares it to western science within the context of ecological observations and resource management. Section three examines the different methodological approaches that have been tried or are being tested in the documentation of traditional knowledge. Section four reviews several examples of efforts to integrate traditional knowledge into the environmental management and assessment processes. The paper concludes with a

discussion of the key issues surrounding the subject, together with recommendations for future action to further the recognition of the value of traditional ecological knowledge to western science.

### WESTERN SCIENTIFIC RECOGNITION OF TRADITIONAL ECOLOGICAL KNOWLEDGE

Natural scientists working in different parts of the world have often remarked on the ability of indigenous people to distinguish and name many of the plants and animals in their environment (e.g., Diamond 1966; Irving 1960; Snyder 1957). In many instances, a close correspondence has been found to exist between the categories of plants and animals named by aboriginal peoples and the scientific taxa. Much of this knowledge also appears to be clearly esoteric for many of the named species serve no obvious utilitarian purpose.

The systematic study of traditional ecological knowledge began in a series of studies eliciting and analyzing the terminologies by which people in different cultures classify the objects in their natural and social environments. The studies of classification systems have shown that all peoples recognize what they consider to be natural classes of animals and plants and that peoples in all cultures are as much concerned to bring classificatory order to their world as are western scientists (e.g., Bulmer 1970; Berlin 1973; Munn 1975).

The results of these early anthropological studies served to enhance the recognition of traditional knowledge among some members of the scientific community. At the same time, increased political pressure to recognize the rights of aboriginal peoples (often within the context of land claims), coupled with a growing international awareness of the important role of traditional knowledge and self-management in achieving sustainable development, has resulted in a shift away from more esoteric studies to applied research. Emphasis in recent years has focused on understanding the ecologically sound practices that contribute to sustainable resource use among indigenous peoples, and ways that this knowledge can be successfully integrated with western scientific resource management.

One of the catalysts to spark the international surge of interest in traditional knowledge was the 1980 World Conservation Strategy (WCS) developed by the International Union for the Conservation of Nature (IUCN), the United Nations Environmental Programme (UNEP), the United



Nations Educational, Scientific and Cultural Organization (UNESCO), the World Wildlife Fund (WWF), and the Food and Agriculture Organization (FAO). The document focused worldwide attention on the global environmental crisis and provided a framework and practical guidance for the conservation actions necessary to ensure the sustainable utilization of the planet's species and ecosystems. Part of the means to achieve sustainable development, it suggested, is to recognize traditional knowledge as an important source of ecological information and to involve local people directly in the management of natural resources.

The recommendations of the *World Conservation Strategy* were further echoed in the publication of the World Commission on Environment and Development (1987) report, *Our Common Future (The Brundtland Report)*. The report called for the development of a science based on the priorities of local people, and the creation of a technological base that blends both traditional and modern approaches to problem solving.

The recommendations of the *World Conservation Strategy* and the *Our Common Future* are being incorporated into the Inuit Regional Conservation Strategy (IRCS) developed through the work of the Inuit Circumpolar Conference and its Environmental Commission. The IRCS represents the first attempt to apply the World Conservation Strategy on a regional basis (in an international sense) and the first attempt by an indigenous people to develop a conservation strategy that stresses the importance of traditional knowledge in resource management (Doubleday 1988).

Within Canada, research incorporating traditional knowledge was part of several milestone land use and occupancy studies in the Northwest Territories and Labrador during the late 1970's. The Inuit Land Use and Occupancy Project (Freeman 1976) and the Mackenzie Valley Pipeline Inquiry (Berger 1977) documented information about the land use of the Inuit, and the Dene and Metis peoples respectively. A similar study entitled *Our Footprints are Everywhere* (Brice-Bennet 1977) documented similar information for the Inuit of Labrador. In addition to delimiting the present and past use and occupation of the land and marine environment, these studies demonstrated the important cultural significance of the land for Native people.

Since the late 1970's, research in the Canadian North has turned to understanding indigenous systems of self-regulation and conservation practices and to investigating the possibilities of indigenous self-management of fish and game resources (Berkes 1977, 1979, 1982, 1983, 1985; Brody 1981; Feit 1979, 1985, 1986, 1988; Beaulieu 1988). Much of this interest has stemmed from the increasing conflict and competition between Native and non-Native interests in resource use, particularly hydro-electric power development in Northern Quebec.

Community-based research about traditional environmental knowledge has been carried out by a number of northern communities themselves. Among the Dene, the indigenous people of the western Canadian Subarctic, papers by DeLancey (1987) and T'seleie (1985) describe the work done in Fort Good Hope on a project to document the traditional knowledge of animal behaviour. The Fort Resolution Oral History project included ecological knowledge in its study (Fort Resolution Elders 1987). Traditional ecological knowledge has also been collected as part of land use planning studies, the work of language centres, and the Dene Mapping Project. Most recently, the Dene Cultural Institute (1989) has initiated a long-term research project to continue the work of documenting Dene traditional ecological knowledge. The ultimate goal of this research project is to integrate this knowledge into the environmental assessment, management and land use planning processes.

A number of governments are also beginning to recognize the value of traditional knowledge and appear to support its role in environmental management. For example, the Government of the Northwest Territories recently affirmed that decisions about resource management and development will reflect the traditional knowledge which can be found in Northern communities. In keeping with this policy, the territorial Department of Renewable Resources (1988) has identified one of its goals as *the maximum involvement of local residents and the maximum use of their knowledge in renewable resource programs*.

On the international scene, the themes of traditional knowledge and local resource management are increasingly being discussed through the work of various international agencies, such as the International Union for the Conservation of Nature and Natural Resources (IUCN), the International Union of Biological Sciences, UNESCO Man and Biosphere Programme, and the United Nations Environment Programme.

In May 1988, the IUCN hosted an international conference in Costa Rica with the purpose of developing a set of guidelines for the documentation and use of traditional knowledge (Baines pers. comm. 1989). As well, the IUCN Commission on Ecology has an active Traditional Ecological Knowledge Working Group that publishes an occasional newsletter *Tradition, Conservation and Development*. Outside of Canada, local self-management of terrestrial and marine resources has been described in India (e.g., Madhav 1985), in New Guinea (e.g., Kwapena 1984), in Indonesia (e.g., Polunin 1985) and in the south Pacific islands (e.g., Johannes 1978, 1983). In South America, research initiatives have been undertaken on traditional agricultural systems (Baines pers. comm. 1989). To date, outside of Canada, there appear to have been few attempts paid to the application of traditional knowledge to environmental assessment (Baines pers. comm. 1989).

One of the most extensive bibliographies about traditional knowledge was compiled by Andrews (1988). Originally prepared for the Dene Nation, the political body representing the Dene, the bibliography references over 200 studies of indigenous peoples' traditional ecological knowledge and management systems.

### **THE NATURE AND TRANSMISSION OF TRADITIONAL ECOLOGICAL KNOWLEDGE**

Traditional ecological knowledge is the body of knowledge or natural history built up by a group of people through generations of living in close contact with nature. It includes a system of classification, a set of empirical observations about the local ecology, and a system of self-management that governs hunting, trapping and fishing. Ecological knowledge and the rules for sustainable resource management are accumulated over generations and passed on by word of mouth (often through stories) and by direct experience. The legitimacy and authority for traditional resource management are determined at the local level. Any deviation from these rules and understandings is met by social pressure as necessary (Osherenko 1988). Although the terms traditional knowledge and self-management are most often used in reference to aboriginal peoples, community-based knowledge and systems of self-management may also be found among other groups of resource users, such as outport fishermen and farmers.

#### **The Nature and Interpretation of Ecological Observations**

Within northern Canada and Alaska, research about indigenous knowledge of specific components of ecosystems has been carried out by a number of scholars. For example, studies have been conducted on the behaviour of moose (e.g., Feit 1973; T'seleie 1985), beaver (e.g., Feit 1988), geese (e.g., Scott 1979, 1986), wolves (e.g., Stephenson 1982) and eiders (Nakashima 1984), on ethnobotany (e.g., Johnston 1987; Turner 1979), on the use of coastal and marine resources (e.g., Ellis and Swan 1981; Ellis and Wilson 1981) on Inuit bird taxonomy (e.g., Irving 1960; Johnson 1987) and on the use of arctic sea-ice resources (e.g., Breton, Smith and Kemp 1984; Freeman 1984). Most of these studies attempt to compare specific elements of the indigenous knowledge system to parallel elements in the scientific system.

For the purpose of this paper, examples of the nature and extent of traditional ecological observations are discussed in reference to the works of Feit (1988), Gunn *et al* (1988) and Stephenson (1982) who worked among the James Bay Cree of Northern Quebec, the Inuit of the western Canadian arctic and the Nunamiut of northern Alaska respectively.

Feit (1988) examined James Bay Cree knowledge of moose and beaver. In the case of beaver, information about the

composition of beaver colonies is continually collected by Waswanipi Cree hunters from signs around the sites, from the sizes and sexes of the beaver caught, and from information collected in the process of butchering beaver. Such knowledge is sought in order to determine how many beaver are present and how many may be taken. Similar patterns of monitoring occur for moose, although for a more dispersed population. The numbers of occupied moose yards, the size of yarding groups, the frequency with which females are accompanied by young, and the frequency of twin young are all noted and discussed by hunters.

In both cases, Feit (1988) remarks that the parameters monitored by the Cree are all ones which wildlife biologists have found to be important indicators of the condition of the game populations. These indicators are useful for management decisions concerning the sustainability of present harvests. Absolute numbers are not recorded, but trends in the basic parameters are noted and discussed by Waswanipi hunters.

Regarding the distribution and use of knowledge within a community, Feit (1988) explains that the monitoring of indicators and the type of information hunters use is not universally available within a local community. This knowledge is typically synthesized only by a limited number of people who generally are leaders in hunting activities. Cree hunting bosses are aided in their judgments of the significance of trends in the wildlife populations on their hunting lands by hearing from others on whether similar trends are occurring elsewhere. For knowledge of current trends to be meaningful, it is also necessary that hunting leaders know the history of the wildlife populations which they are observing. This permits the evaluation of the duration and intensity of the trends, as well as making it possible to relate different points in the development of the trends to specific changes in the environment or to the history of harvesting intensity.

Although hunters and scientists may apply the same ecological indicators in their respective management regimes, the level of information available to the aboriginal hunter differs from that available to the scientist. From their work among the Inuit of the western Canadian Arctic, Gunn *et al* (1988) noted that scientists have the advantage of being able to draw upon the extensive ecological knowledge gathered in many parts of the world for comparison and, with the help of technology, can observe wildlife over large areas or beneath the ice and water.

Aboriginal hunters, on the other hand, have a reservoir of ecological knowledge that has been accumulated over generations. For instance, the arctic ecosystem is characterized by annual variations in the abundance and distribution of wildlife - a single or two seasons' observations can be misleading. The observations of hunters can thus be a valuable guide to some of the longer term changes in wildlife

distribution and behaviour. Similarly, the extensive travel of hunters during winter months leads to observations of behaviour unparalleled by biologists whose winter observations of arctic wildlife are often lacking.

*Gunn et al* (1988:25) suggest that the difference between the two knowledge systems lies not so much in the type of observation (quantitative versus qualitative), but in the organization of the observations and the physical recording of them which for the scientist usually has to be sufficiently detailed to be repeatable or comparable.

*Inuit hunters rarely question observations related by others and do not always ascribe more importance to multiple than single observations: both those characteristics are vital in small social groups and in preparing a hunter for often rare contingencies. The same characteristics are, however, the antithesis of science...*

Similarly, biologist Robert Stephenson (1982:438) notes from his studies of wolves in northern Alaska that the Nunamiut are willing to attribute more importance to individual variation and to volition than are biologists.

*The Nunamiut...believe that some decisions wolves make are likely to be foolish, "inefficient," or ambiguous of interpretation. In contrast, it appears that biologists and even more so, the wildlife-oriented public, look for "adaptive" value in most details of animal behaviour. The wolves I observed did many things that Western science normally refers to as anecdotal behaviour, but which the Nunamiut believed contained rather significant information.*

Stephenson submits that scientists may be reluctant to recognize these elements of volition, instinct and individual idiosyncrasy because they are difficult to quantify. Nevertheless, he stresses, biologists must recognize this side of wolf behaviour and understand that *wolf populations are not composed of identical individuals or packs guided in their every move by ironclad laws of nature* (1982:439).

Stephenson affirms that his work among the Nunamiut forced him to recognize an important difference between the generalized knowledge of an animal obtained through reading, and a more specific working knowledge derived from field experience. His own generalized knowledge, he claims, had actually interfered with his ability to comprehend the behaviour he observed. One must guard against the tendency to gloss over exceptions in the search for general laws, he argues, for it may be that the anomalies observed represent potentially important aspects of animal behaviour.

## Indigenous and the State Systems of Wildlife Management

Although the observations of scientists and aboriginal peoples may be similar, their explanations of how the ecosystem works are based on two different world views. Western science separates the natural and the physical world from the human world. Phenomena are explained in terms of a set of laws which are continually tested over time through the accumulation of more quantified data. The natural environment is viewed as something that can be readily manipulated by humans to serve their needs. Aboriginal cultures, on the other hand, perceive humans and nature as being inextricably linked. The system of beliefs and values of the indigenous society are their basis for explaining the natural and the physical world.

Two distinct epistemologies underlie the indigenous and the state systems of resource management. Usher (1986:71) has outlined the different characteristics of the state and the indigenous systems of resource management as follows:

*The state system rests on a common property concept in which the state assumes exclusive responsibility and capability for managing a resource equally accessible to all citizens. The state manages for certain levels of abundance on a technical basis, and then allocates shares of this abundance to users on an economic and political basis. The system and management problems are resolved in a technical...framework.*

In contrast:

*The indigenous system rests on communal property arrangements, in which the local harvesting group is responsible for management by consensus. Management and harvesting are conceptually and practically inseparable. Knowledge comes from the experience of every aspect of harvesting itself - travelling, searching, hunting, skinning, butchering and eating.*

## How the Indigenous System of Self-management Works

What are the practices employed by aboriginal peoples that ensure the exploitation of ecological resources in an environmentally sustainable manner? The ability to use resources sustainably stems from a combination of two factors:

- (a) the possession of appropriate local ecological knowledge and suitable methods/technology to exploit resources, and

(b) a philosophy and environmental ethic to keep exploitive abilities in check, and to provide ground rules by which the relation among humans and animals may be regulated.

Conservation management strategies have been recorded by a number of researchers working in Canada and in other parts of the world. For example, studies by anthropologists Scott (1987) of goose hunting and Feit (1978) of beaver and moose hunting among the James Bay Cree showed that hunters follow a system of rotation and "resting" of hunting sites. According to Feit (1978), many Cree trappers divide their hunting area into three or four units. They trap only one unit at a time, and rotate the land similar to fallowing in agriculture. Feit's investigation of the system revealed that the harvest from an area rested for two years or more was significantly greater than that from an area harvested with no rest.

Berkes (1981) discusses the importance of the trapline system in the regulation of the use of wildlife resources among the James Bay Cree. As recognized by the government, a trapline is a registered beaver trapping area in which a Cree tallyman or family head has harvesting rights. As seen by the Cree people, a trapline is a traditional family hunting-trapping territory. Accordingly, any violations are dealt with by social pressures rather than by recourse to state law. Only those people who are family members of the tallyman or who have been given permission by him can trap beaver on a trapline. Other people passing through the area can take animals which they encounter. By mutual agreement, there is no permission requirement for such people, and they can harvest animals, especially fish and small game, for their immediate food needs. The workability of this land tenure system is helped by the fact that hunting and fishing are normally done on a subsistence basis.

Elsewhere in the world, Johannes (1978) explains how reef and lagoon tenure was an important marine conservation measure employed in Oceania. The right to fish in a particular area was controlled by a clan, chief, or family, who thus regulated the exploitation of their own marine resources. Fishing rights were maintained from the beach to the seaward edge of the outer reefs. In some areas, where the fishermen sought tuna in offshore "holes", fishing tenure included deep waters beyond the reef. It was in the best interest of those who controlled a given area to harvest in moderation. By doing so they could maintain high sustained yields, all the benefits of which would accrue directly to them. Other conservation measures were related to religious beliefs or taboos. For example, the eating of certain species was forbidden to particular clans, castes, age groups, or to women.

### **The Limitations of the Indigenous System**

One of the major questions raised by scientists and wildlife

managers regarding the indigenous system is whether or not self-regulating systems that existed in the past continue to function effectively today, given the very significant changes now occurring in the North (Usher 1986; Feit 1988). Berkes (1981) and Feit (1988) discuss several examples in Northern Quebec where the indigenous system has broken down as a result of outside influences.

One of the main causes for the breakdown of self-management systems may be attributed to the commercialization of the subsistence hunt (Berkes 1981; Johannes 1978). Incentive to create surplus breaks down the self-limiting principle of a subsistence operation and, together with it, the customary laws that regulate hunter-prey relations. Both Johannes (1978) and Berkes (1981) equate the commercialization of subsistence fisheries in the south Pacific and Northern Quebec respectively with overfishing in these areas.

Also, Feit (1988) provides a few examples of self-management breakdown, particularly in northern Canada. This is perhaps not surprising given the constantly changing and unpredictable environment of the north. What conclusions may be drawn from the limited observations available? The history of self-management is neither a history of continual success, nor a history of continual and cumulative failures. Rather it is a history of the efforts to adapt and maintain self-management to changing circumstances. Moreover, as Berkes (1981) remarks, in cases where the root cause of the perturbation is dealt with, customary law becomes operative once again and the system recovers. In other cases, there may be a permanent change; the ground rules are redefined and the system adapts to change. Under these circumstances, it is possible that the adaptations may not come about smoothly or rapidly and as a result there may be social disruption, which may contribute to poor conservation practices during the period of adjustment.

Regardless of whether self-management systems remain viable today, they may not be able to deal effectively with all of the problems local wildlife managers presently face. As Feit (1988) points out, local wildlife-resource users are only rarely isolated from the impacts of the international economic system or of state policy-making with respect to wildlife and development. National and international commercial interests, sport interests, non-renewable resource developments are all often beyond the direct influence of the practitioners of traditional self-management systems. Consequently, traditional forms of self-management must respond to these threats to wildlife resources and to environments by extending self-management to new forms which regulate the actions of individuals and agencies outside the local or regional groups.

Another threat to the indigenous system is that rules, once widely followed, are no longer being passed down to the

younger generation (Osherenko 1988). Through the process of acculturation, new authority figures (school teachers, outside experts, etc.) begin to displace the elders, reducing the likelihood of compliance with previously held social norms. Additionally, students attending conventional schools have few opportunities to learn the traditional skills of living off the land from their elders. Nevertheless, as Osherenko (1988) points out, most anthropologists working in the North and Native people themselves confirm the continued vitality of aboriginal cultures, and note that social norms and practices are changing or evolving rather than dying. Therefore, it must not be assumed that customary law is no longer protecting wildlife in the North.

### The Limitations of the State System of Wildlife Management

While the indigenous system of resource management may have its limitations, it must not be forgotten that state management also has its share of problems, particularly in the North. A major obstacle to effective scientific wildlife management practices in northern Canada is the lack of knowledge of the ecology available to wildlife managers. As Theberge (1981:21) states:

*The depth of ecological ignorance is relatively greater in the north than elsewhere in Canada...For example, a large increase in the size of the Kaminuriak herd in 1982 cannot be interpreted. It may have been due to census error, or in-migration, or in part to significantly higher than normal survivorship of calves.*

A second obstacle is the scale of the environment with which scientists and managers have to deal (Beaulieu 1988). This is simply too large and complex to be able to understand all of the interrelationships between the different components. Hence, it is difficult to conduct experiments and to extrapolate the results. As a result of these shortcomings, the managerial response has often been to depend very heavily on assumptions to fill the gaps (Freeman 1985).

The problem is enhanced by the often highly specialized education that scientists receive as opposed to a more interdisciplinary approach. As Riewe and Gamble (1988) point out, wildlife managers are usually well-trained in zoology, botany, ecology, statistics and computer sciences, but they are inadequately trained in the social sciences, including anthropology, linguistics, psychology, and sociology. When a southern-trained biologist accepts a northern position, he or she usually arrives without any cross-cultural experience and is replete with southern cultural myths of the North and Native peoples. As Riewe and Gamble (1988:32) observe, *all too often these southerners believe that traditional Native management of wildlife was based merely on the fact that their hunting technology was so crude that they were unable to over-exploit their environment.*

Another problem with the state system is that the nature of its operation is fundamentally ill-suited to aboriginal communities. As Osherenko (1988:7) points out:

*It often relies on cumbersome paper-work (licenses, harvest tickets, reports), which is impractical in communities based on individual bag limits rather than community needs. It relies on seasonal limits and gear restrictions that are often at odds with subsistence needs. Ultimately, it enforces by fine, forfeiture, seizure, and even personal confinement, rather than by social pressure to conform to community standards. Understandably, compliance with governmental rules is generally low.*

However, she notes, there are some efforts on the part of public authorities to adapt the system to meet indigenous needs. For example, regulators try to match seasonal restrictions with users' seasonal needs. The Northwest Territories Department of Renewable Resources issues general hunting licenses annually to Natives (permitting them to hunt in any season for subsistence needs and to trap in accordance with season restrictions), and agencies in Northern Quebec do not impose regulations on native users except in cases of conservation need, and then only after consultation. Although these adjustments solve some of the problems of dualism, they fail to give indigenous users a sense of ownership in the decision-making process and do not address the difficult issues that arise when state managers fear over exploitation of a species.

### Towards an Integration of the Two Systems

A pivotal question in the whole discussion of traditional knowledge is the role it should play in the environmental management process. A complementary question is whether or not the state and the indigenous systems of resource management should develop separately or whether an integrated approach is the desired goal. There appears to be agreement among most scientists, governments and aboriginal peoples that integration of the two systems is necessary given the pluralistic nature of society, and the fact that the decisions and actions of one group, no matter how autonomous, invariably have implications for other groups (Mulvihill 1988). Furthermore, information obtained when either system operates alone is often incomplete and can lead to inaccurate conclusions. Thus both sets of data are necessary to produce a full ecological picture.

Despite considerable discussion regarding the most effective and just means to integrate the two systems, no one to date has been able to describe what a truly integrated state/indigenous wildlife or environmental management arrangement would look like or what the best approach to attain this ideal would be. Mulvihill (1988: 15) submits that it would be inappropriate to attempt to achieve complete

integration of the two systems:

*The indigenous system, for example, should not attempt to duplicate or reinforce bureaucratic, top-down hierarchical structures - they **are** antithetical to its **practices**. Integration of the two systems need not necessarily dilute the essence of either system, nor should it invalidate the underlying principles of either one. To embrace some of the epistemology of the indigenous system would not automatically imply the death of science for the state system. Instead, it might only mean that the scientific method was itself subjected to the same kind of rigorous scrutiny that it inflicts upon the phenomena which it encounters.*

In northern Canada, the future development of both systems must be considered within the context of devolution. The devolution of powers to the regional or local level in the Northwest Territories, through such vehicles as Native claims settlements, transfer of powers from federal to territorial or local authorities, and the establishment of cooperative management boards, is currently in progress. Usher (1986) sees devolution taking two forms: the movement of authority and responsibility from a higher to a lower level within an established and intact framework, or the actual transfer of authority and responsibility from one system to another, which implies a transformation of the management paradigm. In regard to resource management Usher (1986:78) states:

*Devolution is a necessary but not sufficient condition for conservation. Self-management, in a context where the necessary self-regulating mechanisms can operate effectively, is also needed. How do we get there?*

At present, co-management regimes represent the most widespread attempt to integrate the two systems.

*A co-management regime is an institutional arrangement in which government agencies with jurisdiction over resources and user groups enter into an agreement covering a specific geographic region and spelling out:*

- 1) a system of rights and obligations for those interested in the resource;*
- 2) a collection of rules indicating actions that subjects are expected to take under various circumstances; and*
- 3) procedures for making collective decisions affecting the interests of government actors, user organizations, and individual users (Osherenko 1988: 13).*

Seven wildlife co-management regimes have been created in the North American Arctic to solve problems caused by clashes between indigenous and state systems of wildlife

management, and several others are in various stages of evolution (Osherenko 1988). These include the James Bay and Northern Quebec hunting, fishing and trapping regime, the Alaskan whaling regime (Bering and Beaufort Seas; Alaskan whaling communities), the Beverly and Kaminuriak caribou management regime (central Canadian Arctic), the Inuvialuit wildlife harvesting and management regime (Inuvialuit Settlement Region within the N.W.T.), the Beluga management regime (Northern Quebec), the Canadian Porcupine caribou herd management regime (northwestern Canada, Yukon and N.W.T.) and the Pacific walrus regime (Coastal areas of northwestern Alaska). These regimes vary in their structure and in the degree of power accorded the participating user groups. Papers that discuss specific examples of co-management include Osherenko 1988; DeLancey and Andrews 1988; Freeman 1985; Gunn *et al* 1988; Lloyd 1986; Usher 1986 and Cizek 1988.

Most of these co-management regimes have been in existence for less than ten years, and it is difficult to draw any firm conclusions regarding their degree of success or failure. From her evaluation of the Beverly-Kaminuriak Caribou Management Plan, the Northern Quebec Beluga Management Plan and the Yukon-Kuskokwim Delta Goose Management Plan in Alaska, Osherenko (1988) concludes that co-management in these cases has at least produced improved communication and understanding between Native users and public authorities. In addition, the cases suggest that co-management has changed hunting practices in the interests of protecting declining species.

Nevertheless, in spite of an obvious step forward in bringing the state and the indigenous systems together to help solve environmental problems, these boards have only an advisory capacity. The question remains to what extent these boards actually incorporate new innovative strategies to problem solving, as opposed to using traditional knowledge merely to provide data for a decentralized state system, which continues to adhere to the scientific paradigm and to do the managing. The question for the future is whether these boards will be adopted as a model for comprehensive wildlife management under land claims settlements. And if so, which management system will provide the framework and who will retain authority?

If the integration of traditional knowledge and science is the desirable goal, why are there not many more examples of it taking place today? There are several related responses to this question. First, the problem appears to be clearly linked to the question of political power. Co-management may be regarded as an incremental step towards self-management for aboriginal peoples (Mulvihill 1988). Second, the present bureaucratic system is unable and or unwilling to respond effectively to the needs of small communities (Marshall 1986). And third, like most other elite groups in societies worldwide, scientists (as professionals) erect boundaries to keep out

threatening ideas that might jeopardize their superior status (Freeman 1986). This general lack of support at the political, bureaucratic and scientific level means that there is a chronic lack of sufficient funding over a long enough period of time to enable innovative resource management projects to survive.

## METHODS USED TO DOCUMENT TRADITIONAL ECOLOGICAL KNOWLEDGE

### The Ethnographic Method

Field work in the area of traditional knowledge for the most part follows standard ethnographic methods. Ethnography is the work of describing a culture. The goal of ethnography, as Malinowski (1925:25) put it, is to *grasp the native's point of view, his relation to life, to realize his vision of his world*. A fundamental principle of ethnographic research is that it is based on fieldwork: the research is conducted on the group's home ground (Agar 1980). Information may be collected through surveys, directed interviews or open-ended interviews, in a variety of settings. Interviews may be conducted with one individual at a time or in a group setting, either in a community or in bush camps. The most appropriate setting is often the camp, rather than the permanent settlement, and especially at the time when hunting, fishing and food gathering activities are actively underway. Another field technique which may be used alone or in conjunction with interviews is participant observation, whereby the researcher participates directly in the daily life of the society under observation. This procedure allows the investigator to observe people's actions, and conduct informal discussions in a more natural social setting.

DeLancey (1987: 19) reports the value of a combined interview and participation approach used by local residents to gather data in the Fort Good Hope Traditional Knowledge study:

*The Fort Good Hope study successfully combined a straight questionnaire survey method with the more open-ended approach of ethnographic field research. In this approach of ethnographic field research, the community researcher is supplied with a set of open-ended questions which will help to focus discussion on the study goals. The researcher has to use his/her discretion to elicit more detailed responses, to keep the interviews on track and to determine when to draw an informant back to the topic. The researcher's own awareness of the cultural context and linguistic context is an invaluable asset to this process. However, the direct confirmation of data provided by the participant observation technique would strengthen the results.*

Feit (1985) also used a variety of techniques to document traditional knowledge about moose and moose management

systems. He talked to hunters about how to hunt moose, listened to descriptions of specific hunts, asked specific questions about words and expressions used in the Cree language when talking about moose, and participated in casual conversations.

In his study of Northern Quebec Inuit knowledge of eider ecology Nakashima (1984) reports that hunters were interviewed individually or in small groups. Geographic information, which dealt primarily with migration routes, feeding/flocking areas, nesting sites and northern wintering areas, was recorded on large-scale maps or on air photos. Other types of information, such as breeding and feeding ecology and behaviour, were tape-recorded for subsequent transcription. For the actual format of the interview, a rigid style involving formalized sets of questions was avoided because it tended to draw out only short, specific answers. It proved more fruitful, he stated, to open the interview with a simple request to "tell about eiders", because it prompted the Inuit to take the initiative, leading the discussion into topics that they themselves considered important and which otherwise might not have been addressed. He notes that it is important to realize that although interviews provide a certain degree of insight into the nature of Inuit knowledge, they are subject to the shortcomings inherent to imposing the information gathering techniques of one culture upon another. In order to arrive at a true understanding of Inuit knowledge, Nakashima claims, it must be the Inuit who decide upon the information to be gathered and its method of collection.

However, the open-ended interview approach does pose some problems. Unstructured interviewing can become very time consuming and in the long run expensive. Considerable effort must be devoted to sifting through data to find specific types of information. This issue is particularly important to consider when traditional knowledge is to be used in conjunction with scientific data for the purposes of wildlife management or environmental assessment.

### Community-based Research

Since the coming of the first European explorers and the early missionaries to northern Canada, Native peoples have been the subject of numerous studies seeking to describe various aspects of their ways of life. In more recent years, social scientists representing universities and other academic institutions, government agencies and industry have carried out a variety of research projects. Unfortunately, in many cases, the topics of investigation have had little relevance to the concerns of Native peoples, and more often than not, the results of the studies have not been communicated back to the people who have shared their knowledge. In an effort to alleviate this problem, a growing number of aboriginal groups around the world are now taking measures to acquire control over their own research. This community-based approach to research involves the active participation of communities in

determining research priorities, and the training of local researchers to carry out all phases of the research process. The fundamental goal is to build a community's capacity for generating knowledge to solve problems (Social Sciences and Humanities Research Council 1983).

Within northern Canada, at least two projects are presently taking this approach to research traditional environmental knowledge. The Dene Cultural Institute (1989) has mounted a multi-year study to continue the work of documenting the traditional ecological knowledge in all regions of Denendeh with the ultimate goal of applying it to environmental management. One of the primary objectives in carrying out the research is to develop an innovative and appropriate methodology for regional scale, community-based research. On the Belcher Islands, N.W.T., the Hunters and Trappers Association of Sanikiluaq and researchers from the Boreal Institute, University of Alberta (Freeman 1988) and other universities are attempting to apply the adaptive management approach to a case study in resource management. Both projects are committed to training local residents to assume the various roles necessary to carry out a research project.

### **Technical Dictionaries**

Another approach being used to document traditional ecological knowledge in the community of Marovo Lagoon in the western Solomon Islands is the preparation of a series of technical dictionaries embracing four of the five languages of the area (Baines pers. comm. 1989). While the main dictionary is in the dominant Marovo language on the topic Environment and Resources, the others are primarily plant dictionaries listing local names and uses including scientific names. Baines notes that one particular advantage of the technical dictionary approach is that results can be made available to the community quickly.

### **Ecological Knowledge and Land Use Studies**

In addition to the land-use and occupancy studies mentioned earlier, the research department of the Makivik Corporation representing the Inuit of Northern Quebec, has been involved in an ecological knowledge and land-use study for the past ten years. The purpose of this research project, which is now drawing to a close, was to provide a precise information base on past and present land use, and on the extensive knowledge hunters have to support their patterns of land use. According to Kemp (1987), information was gathered by individual and group interviews. These interviews resulted in the creation of individual hunter maps by species, season and time period; and they also resulted in ecological maps for individual species supported by written descriptive notes and taped interviews. All of the information has been compiled on mapping computers according to special programs written to accommodate the data and to produce maps and descriptive texts in Inuktitut.

The research has been funded by the Makivik Corporation in order to ensure Inuit control over the use of the information. The data are presently being used by Kativik School Board for the development of education programs and for the creation of local geographies. The information is also being incorporated into an extensive wildlife management policy and program for Northern Quebec (Jacobs 1988). It is designed to develop a comprehensive approach to management that includes the biology and ecology of resources for subsistence, non-consumptive and, when warranted, commercial purposes. The objective is to determine a strategy for management that will enable Inuit to identify and maintain healthy wildlife populations, as well as to identify geographic areas or species populations in which problems now occur so that management solutions can be established.

Geographical Information Systems offer another possibility for managing traditional ecological knowledge data. Designed to store and to analyze geographically referenced data through the use of computerized mapping, a GIS could provide a valuable tool to aid in the resource management decision-making process. In the Baffin Island Region, the Environmental Technology Program of Arctic College has explored ways to develop a geographical information system which will incorporate traditional knowledge gathered by students and staff (Rigby pers. comm. 1989).

### **The Adaptive Management Approach**

Adaptive management is a new approach emerging in the resource sciences that provides a potential methodological framework for helping aboriginal peoples and scientific resource managers to work together to resolve environmental problems. It is an open-ended, systematic process that designs management activities and policies that are responsive to biological changes occurring within a system, based on both indigenous knowledge of ecological relationships and scientific processes of knowledge. It is a concept that has risen from fundamental questioning of conventional scientific approaches to the management of renewable resources, and recognition of the need to develop an alternative, pragmatic approach based on discovering how a "partially-observed" system functions (McDonald 1988). A basic assumption of adaptive management is that socio-economic dynamics are inherent in the utilization of resources and must be taken into consideration if resource management problems are to be alleviated.

Furthermore, adaptive resource scientists question the adequacy of the linear-reductionist mode of inquiry, as they claim there is no assurance that understanding how an ecological system functions at a given moment will provide insight into how it will function under changed circumstances in the future. The act of management itself alters relationships



and causes unknown changes within an ecological system, so that systems under study may be changing faster than they can be scientifically understood (Holling et al 1978). The goal is to develop an understanding of the implications of specific management decisions and to explore the response patterns of systems in order to identify new policy instruments and options. Management, as a result, becomes a continual process of analyzing historic experience in relation to ecological theory and constraints and directing searches for productive and sustainable harvesting policies.

Adaptive management is a “learning by doing” process in which all management actions are treated as well-designed experiments that will produce short-term system responses and better information for long-term management decisions (Walters and Hilbom 1978, cited in MacDonald 1988). Adaptive management is system-specific and an open-ended process in which there are the following phases of activity:

1. dialogue to determine the goals of management and the boundaries of the problem;
2. field study and analysis to determine the biological relationships that relate to the goals of management;
3. design of alternative management actions in light of (2) above;
4. monitoring and assessment of management actions; and
5. evaluation including determination of likely impact of alternative management options.

Successful implementation of the adaptive management process is dependent on bringing all the actors involved in the management and utilization of a particular resource together, and creating an environment conducive to addressing long-term management concerns. Open communication is integral to guiding field studies, analysis, modelling and consequent judgement about the likely impact of alternative management methods (Holling 1978). Dialogue is initiated and continues through a series of structured workshops. The workshops are designed to, first identify the range of ecological and social variables for consideration in the management of the resource, and, second, to determine through active discussion the alternative methods for management.

As mentioned above, the potential for applying the adaptive management approach to northern renewable resources management is presently being tested in the joint Boreal Institute/Belcher Islands community-based research project. The purpose of this case study is to combine traditional knowledge and scientific investigative techniques to design a management scheme to manage the reindeer and their range on the Belcher Islands (Freeman 1988).

## EXAMPLES OF THE APPLICATION OF TRADITIONAL ECOLOGICAL KNOWLEDGE TO ENVIRONMENTAL ASSESSMENT AND MANAGEMENT

### Environmental Monitoring

For a number of years Native communities have argued for a stronger role in monitoring the effects of energy development in the Canadian North. Everitt (1986) reviews two examples where traditional knowledge was incorporated into environmental monitoring programs -- the Mackenzie Environmental Monitoring Program and post-construction monitoring by the Dene of the Norman Wells Oilfield expansion. He concludes from examination of these two programs that Native people have an important role to play at all stages of environmental monitoring for energy developments. Everitt (1986:46) observes that, because they are present at all times *they are the best people to identify priorities for monitoring, the best people to collect harvest statistics, and they are the best people to monitor for local effects.*

Everitt (1986) recommends that northern communities be given contracts to undertake surveillance and local effects monitoring for those energy development activities that have direct effects (e.g., seismic activity) on the land and its resources. Monitors, he contends, should be responsible to the community and not the development companies as is currently the case. Furthermore, the community should direct the programs, and although scientific expertise would have a role to play, traditional knowledge should also be regarded as an important source of information.

The role of Native groups in monitoring programs designed to determine the regional effects is less clear. Everitt (1986) argues. Many of the regional programs have been concerned with determining effects at the population level for important fish and wildlife species. Native groups, he maintains, are at no particular advantage or disadvantage when it comes to mounting these programs. He suggests that the conduct of programs to look at the regional impacts will likely remain in the domain of the scientific community. However, the role of the Native groups will be in setting the scope and priorities of these programs.

Elsewhere, a community environmental monitoring project is being developed as part of the Marovo Lagoon traditional ecological knowledge project in the Solomon Islands (Baines pers. comm. 1989). Part of the exercise is to train people in methods of handling information and making conclusions about seasonal trends and causes of these trends. While this is a modern intervention, traditional observations, ideas and approaches will be incorporated into the monitoring package. In summary, the idea is to build on traditional knowledge, using appropriate modern interventions.

## Land Use Planning

Regional land use planning provides another forum for the integration of traditional knowledge. For example, the 1983 Land Use Planning Basis of Agreement for the Northwest Territories states that:

- *plans must reflect regional residents' values and priorities,*
- *plans must provide for conservation and development of all land and water resources,*
- *including the offshore,*
- *planning should be done in the North by Northerners,*
- *public participation is essential,*
- *native people have special interests and roles to play* (Robertson 1989:38).

A proposal for a land use plan for the Lancaster Sound region was prepared after two years of consultation with local communities, industries, special interest groups and government departments and agencies. Traditional knowledge was used in the planning exercise to identify community concerns, and was combined with scientific information to document and map the natural resources and cultural features of the Region (Lancaster Sound Regional Land Use Planning Commission 1989).

## The Canadian Federal Environmental Assessment and Review Process (EARP)

Undoubtedly, the most successful attempt to incorporate traditional knowledge into the environmental assessment process in Canada was the Berger Inquiry in the late 1970's. This process provided an informal forum for Native people to express their concerns about the impacts of the proposed Mackenzie Valley Pipeline. Their opinions, based on traditional knowledge, received important consideration in the final decision-making process (Berger, 1977). Since the Berger Inquiry, public consultation and review phases have remained the principal methods of including traditional knowledge in environmental assessment. Whether traditional knowledge and the views of aboriginal peoples continue to receive adequate recognition through this forum has been questioned in a number of recent discussion papers and workshops.

One issue of concern raised in the National Consultation Workshop on Federal Environmental Assessment Reform (Federal Environmental Assessment Review Office 1988), and also by a number of individuals consulted during the course of writing this paper, was the need for the acceptance of non-technical data provided by non-scientists as a credible source of information. Environmental experts selected as advisors for the EARP process are generally chosen according to their academic and professional qualifications. Most of the aboriginal persons who would be recognized as "experts" in

their communities by virtue of their extensive knowledge and understanding about the local environment would not possess the necessary qualifications (based on "southern" standards) that would allow them to participate as technical experts under the current process.

Another issue raised during workshop discussions and personal interviews was the unequal access of all interested persons to participation in a public review. In many cases, individuals or groups are prevented from full participation because of inadequate financial support, access to "expert" advice, time to analyze documents, and resources to organize participation. In the case of aboriginal peoples, language and cultural differences as well as geographic isolation may exacerbate these inequities. As a result, there may not be adequate opportunities for aboriginal peoples to make panel submissions which evaluate a problem from the perspective of traditional knowledge.

A number of EA panel reports (e.g., Eastern Arctic Offshore Drilling - South Davis Strait Project; Lancaster Sound Drilling) note the lack of available baseline data from government agencies responsible for biological research and management (Federal Environmental Assessment Review Office 1978, 1979). As has been reiterated throughout this paper, local residents harbour a vast reservoir of knowledge about the local ecosystem that could be utilized to advantage in this part of the environmental assessment process. Current observations about different ecological components, combined with knowledge of historical trends, could aid significantly in understanding the potential impacts of development projects.

Despite its shortcomings, there is evidence that the federal environmental assessment review process is moving towards the recognition of traditional knowledge. For example, the present environmental assessment review of military flying activities in Labrador and Quebec is attempting to involve Native people directly in providing environmental information for the Environmental Impact Statement. As well, the Federal Environmental Assessment Review Office (FEARO) recently hosted a workshop on how aboriginal and other rural communities apply traditional knowledge to resource sustainability. An important theme of the workshop will be how to communicate more effectively with communities that become involved in the environmental assessment process.

## DISCUSSION AND CONCLUSION

That non-western cultures should have a profound understanding about the functioning of local ecosystems should come as no surprise. As Feit (1988:76) points out, *there is no reason not to expect that indigenous peoples, any less than people of European descent, would develop a realistic body of knowledge about an environment with which they*

*intensively interact, or that they would use that knowledge to conserve or manage resources which they value.*

Only recently has the western scientific community begun to recognize the value of the vast reservoir of ecological knowledge held by the world's aboriginal peoples. This reticence on the part of scientists to accept traditional knowledge and the self-management of wildlife resources may be attributed in large part to their ethnocentric view of science. In this view, not only are those who do not subscribe to the scientists' definition of the problem held to be somehow lacking in their understanding of reality, but also where these scientists have few solid facts to support their assertions, they still expect non-scientists to accept their opinions as if they were statements of fact (Freeman 1986). Indigenous knowledge systems and forms of self-management are often overlooked because they depend on social institutions and practices unfamiliar in western society, and are fundamentally different from forms of bureaucratic decision-making and highly specialized fields of responsibility which characterize state-mandated wildlife management systems (Feit 1988).

Despite the different epistemologies underpinning the two systems of knowledge and resource management, they also share some degree of commonality between them. Namely, both systems rest upon the foundation of empirical observation and deductive logic, and both seek to manage natural resources in an environmentally sustainable manner.

Much of the scepticism on the part of state resource managers towards the indigenous knowledge system stems from the belief that, while it may have been impressive in its earlier forms, it is being irreversibly eroded by assimilation of aboriginal peoples into western culture, and by the failure of elders to pass on the knowledge to younger generations. In addition, the fact that traditional knowledge is based upon oral tradition and is concerned not so much with actual statistics but more with ecological trends does not lend itself to science, which emphasizes rigour and precision.

It is undoubtedly true that some erosion of the indigenous knowledge system has taken place. However, both the research of social scientists and the claims of aboriginal peoples themselves demonstrate that major elements of the knowledge system, including self-management practices, continue to persist. In any event, the indigenous knowledge system should no more be judged for its worth according to a static image of the past than should the knowledge system of any other culture. As Howes and Chambers (1980:331) point out, the knowledge system of any culture is constantly changing through the *assimilation of 'outside' knowledge and synthesis and hybridization with existing knowledge*. Furthermore, as Usher (1981:68) states, *that a body of law is referred to as customary does not mean it is necessarily antiquated or immutable. Our own legal system is always being modified and updated.*

Bearing this in mind, the challenge now facing both state wildlife managers and aboriginal peoples is how to design a system that recognizes the strengths and the limitations of both paradigms and is just in its distribution of authority. The first step towards achieving this goal requires that traditional knowledge be documented by aboriginal peoples themselves. It is only through documentation that its usefulness can become apparent and an improved understanding can be gained of the practices and conditions which lead to the breakdown and reestablishment of self-management systems. Secondly, the guidance of the elders and the cooperation of the youth must be sought in order to make customary law relevant again. For example, find out what customary law has to say about the use of air-planes and snowmobiles, and about intersettlement trade or commercial fishing. How would these laws be enforced (Usher 1986)? Thirdly, government and the scientific community must work towards developing an environmental assessment and management process that is flexible enough to accommodate new ideas and methods, and which accepts science as only one method of seeking new knowledge and new interpretations of that knowledge. Finally, aboriginal peoples must be fully involved in the design and production of any future resource management schemes, and they must be recognized through their participation with equal authority and legal standing.

The most urgent problem currently facing traditional knowledge is its rapid disappearance with the passing away of the older generations. Unless efforts are made to salvage it quickly, not only will it mean the loss of an important part of the cultural history of humankind, but it may also mean the loss of an important source of information. This has the potential to enhance our understanding of species and ecosystems and offer us important new insights into the sustainable use of the earth's natural resources.

## REFERENCES

- Agar, M.H. 1980. *The Professional Stranger - an Informal Introduction to Ethnography*. New York: Academic Press.
- Andrews, T. 1988. Selected bibliography of native resource management systems and native knowledge of the environment. In M.M.R. Freeman and L.N. Carbyn (eds.). *Traditional Knowledge and Renewable Resource Management in Northern Regions*. Edmonton: Boreal Institute for Northern Studies, 105-134.
- Baines, G. 1989. Chairman, IUCN Traditional Ecological Knowledge Working Group, personal communication.
- Beaulieu, J.M. 1988. The Role and Importance of Inuit Knowledge for Wildlife Management and Conservation in the North. Unpublished M.E.S Thesis. Faculty of Environmental Studies, York University.

- Berger, T. 1977. *Northern Frontier, Northern Homeland*. The Report of the Mackenzie Valley Pipeline Inquiry. Volume One. Toronto: James Lorimer and Co.
- Berkes, F. 1977. Fishery resource use in a subarctic Indian community. *Human Ecology*, 5(4):289-309.
- Berkes, F. 1979. An investigation of Cree Indian domestic fisheries in northern Quebec. *Arctic*, 32(1):46-70.
- Berkes, F. 1981. The role of self-regulation in living resource management in the north. In M.M.R. Freeman (ed.). *Proceedings: First International Symposium on Renewable Resources and the Economy of the North*. Ottawa: Association of Canadian Universities for Northern Studies, 166-178.
- Berkes, F. 1982. Waterfowl management and northern Native peoples with reference to Cree hunters of James Bay. *Muskox*, 30:23-36.
- Berkes, F. 1983. Quantifying the harvest of native subsistence fisheries. In R.W. Wein *et al* (eds.). *Resources and Dynamics of the Boreal Zone*. Ottawa: Association of Canadian Universities for Northern Studies.
- Berkes, F. 1985. Fishermen and "the tragedy of the commons." *Environmental Conservation*, 12(3): 199-206.
- Berlin, B. 1973. Folk systematics in relation to biological classification and nomenclature. *Annual Review of Ecology and Systematics*, 4:259-271.
- Breton, M., T.G. Smith and B. Kemp 1984. *Studying and Managing Arctic Seals and Whales: the Views of Scientists and Inuit on Biology and Behaviour of Arctic Seals and Whales, harvesting Sea Mammals, Management and Conservation for the Future*. Ottawa: Minister of Supply and Services.
- Brice-Bennett, C. (ed.). 1977. *Our Footprints are Everywhere*. Nain, Labrador: Labrador Inuit Association.
- Brody, H. 1981. *Maps and Dreams: Indians and the British Columbia Frontier*. Toronto: Douglas and McIntyre.
- Bulmer, R. 1970. Which came first, the chicken or the egg-head? In J. Pouillon and P. Maranda (eds.). *Exchanges et communications*. Vol. II. Hague: Mouton & Co, 1069-1091.
- Cizek, P. 1988. The Beverly and Kaminuriak Caribou Management Board: A Case Study of Aboriginal participation in Resource Management. Unpublished M.A. Thesis, Department of Environment and Resource Studies, university of Waterloo.
- DeLancey, D.J. 1987. *Proposed Research Design for the Documentation of Traditional Knowledge*. Report prepared for the Dene Nation.
- DeLancey, D.J. and T.D. Andrews. 1988. Denendeh (western Arctic). In F.G. Cohen and A.J. Hanson (eds.). *Community-based Resource Management in Canada: An Inventory of Research and Projects*. Ottawa: Canadian Commission for UNESCO, Man and the Biosphere Program.
- Dene Cultural Institute. 1989. *Dene Traditional Environmental Knowledge Pilot*. Yellowknife.
- Department of Renewable Resources. 1988. *Department Mandate and Goals for the 1989-90 Budget Year*. Yellowknife: Government of the Northwest Territories.
- Diamond, J.M. 1966. Zoological classification system of a primitive people. *Science*, 15 1:1102- 1104.
- Doubleday, N. 1988. The Inuit Regional Conservation Strategy: Sustainable Development in the Circumpolar Region. Ottawa: Inuit Circumpolar Conference.
- Ellis, D.W. and L. Swan. 1981. *Teachings of the Tides: Uses of Marine Invertebrates by the Manhousat People*. Nanaimo: Theytus Books.
- Ellis, D.W. and S. Wilson. 1981. *The Knowledge and Usage of Marine Invertebrates by the Skidegate Haida People of the Queen Charlotte Islands*. Charlotte City: The Queen Charlotte museum Society, Monograph series No. 1.
- Everitt, R.R. 1986. Native roles in monitoring of energy developments. In *Native People and Renewable Resource Management*. Edmonton: Alberta Society of Professional Biologists.
- Federal Environmental Assessment Review Office. 1978. *Report of the Environmental Assessment Panel: Eastern Arctic Offshore Drilling - South Davis Strait Project*. Ottawa: Ministry of Supply and Services Canada.
- Federal Environmental Assessment Review Office. 1979. *Report of the Environmental Assessment Panel: Lancaster Sound Drilling*. Ottawa: Ministry of Supply and Services Canada.
- Federal Environmental Assessment Review Office. 1988. *The National Consultation Workshop on Federal Environmental Assessment Reform: Report on Proceedings*. Ottawa: Ministry of Supply and Services Canada.

- Feit, H.A. 1973. The ethno-ecology of the Waswanipi Cree: or how hunters can manage their resources. In B. Cox (ed.). *Cultural Ecology*. Toronto: McClelland and Stewart, 115-25.
- Feit, H.A. 1978. Waswanipi Realities and Adaptations: Resource Management and Cognitive Structure. Unpublished PhD. Dissertation, McGill University, Montreal.
- Feit, H.A. 1979. Political articulations of hunters to the state: means of resisting threats to subsistence production in the James Bay and Northern Quebec Agreement. *Etudes/Inuit/Studies*, 3(2):37-52.
- Feit, H.A. 1985. Legitimation and autonomy in James Bay Cree responses to hydroelectric development. In N. Dyck (ed.). *Indigenous Peoples and the Nation State: Fourth World Politics in Canada, Australia and Norway*. St. John's: Memorial University, Institute for Social and Economic Research, 27-66.
- Feit, H.A. 1986. James Bay Cree Indian management and moral considerations of fur bearers. In *Native People and Renewable Resource Management*. Edmonton: Alberta Society of Professional Biologists, 49-65.
- Feit, H.A. 1988. Self-management and state-management: forms of knowing and managing northern wildlife. In M.M.R. Freeman and L.N. Carbyn (eds.). *Traditional Knowledge and Renewable Resource Management*. Edmonton: Boreal Institute for Northern Studies, 72-91.
- Freeman, M.M.R. 1976. *Inuit Land Use and Occupancy Project*. 3 Volumes. Ottawa: Indian and Northern Affairs.
- Freeman, M.M.R. 1984. Contemporary Inuit exploitation of the sea-ice environment. In A. Cooke and E. Van Astine (eds.). *Sikimuit: the People of the Sea Ice*. Ottawa: Canadian Arctic Resources Committee.
- Freeman, M.M.R. 1985. Appeal to tradition: different perspectives on arctic wildlife management. In J. Brosted et al (eds.). *The Quest for Autonomy and Nationhood of Indigenous Peoples*. Bergen: Universitetsforlaget, 265-281.
- Freeman, M.M.R. 1986. Renewable resources, economics and Native communities. In *Native Peoples and Renewable Resource Management*. Edmonton: Alberta Society of Professional Biologists, 29-37.
- Freeman, M.M.R. 1988. *Traditional Knowledge and Adaptive Management: A Northern Canadian Case Study and Action Plan*. A proposal submitted jointly by the Weasel's Hunters and Trappers Association, Sanikiluaq, N. W.T. and the Boreal Institute for Northern Studies, University of Alberta.
- Fort Resolution Elders. 1987. *That's the Way We Lived*. Yellowknife: Northwest Territories Culture and Communication Outcrop.
- Gunn, A., G. Arlooktoo and D. Kaomayak. 1988. The contribution of ecological knowledge of Inuit to wildlife management in the Northwest Territories. In M.M.R. Freeman and L.N. Carbyn (eds.). *Traditional Knowledge and Renewable Resource Management in Northern Regions*. Edmonton: Boreal Institute for Northern Studies Occasional Publication No. 23, 22-29.
- Holling, C. et al. 1978. *Adaptive Environmental Assessment and Management*. Toronto: Wiley.
- Hunn, E. 1975. *Cognitive Processes in Folk-ornithology: The Identification of Gulls*. Berkeley: University of California. Language - Behaviour Research Laboratory, Working paper No. 42.
- Irving, L. 1960. *Birds of Anaktuvuk Pass, Kobuk and Old Crow*. Washington: United States National Museum, Bulletin 217.
- Jacobs, P. 1988. Towards a network of knowing and of planning in northern Canada. In W.C. Wonders (ed.). *Knowing the North: Reflections on Tradition, Technology and Science*. Edmonton: Boreal Institute for Northern Studies, 21, 51-60.
- Johannes, R.E. 1978. Traditional marine conservation methods in Oceania and their demise. *Annual Review of Ecology and Systematics*, 9: 349-364.
- Johnson, M.C. 1987. Inuit Folk-ornithology in the Povungnituk Region of Northern Quebec. Unpublished M.A. Thesis, Department of Anthropology, University of Toronto.
- Johnston, A. 1987. *Plants and the Blackfoot*. Lethbridge: Lethbridge Historical Society, Occasional Paper No. 15.
- Kemp, W. 1987. Makivik Research Department and development of Inuit-based research and scientific education. In W.P. Adams (ed.) *Education, Research, Information Systems and the North*. Ottawa: Association of Canadian Universities for Northern Studies, 39-42.
- Kwapena, N. 1984. Traditional conservation and utilization of wildlife in Papua New Guinea. In J. Hanks (ed.). *Traditional Life-styles, Conservation and Rural Development*. Gland: IUCN, 22-26.
- Lancaster Sound Regional Land Use Planning Commission. 1989. *The Lancaster Sound Proposed Regional Land Use Plan*.

- Lloyd, K. 1986. Cooperative management of polar bears on northeast Baffin Island. In *Native People and Renewable Resource Management*. Edmonton: Alberta Society for Professional Biologists, 108-116.
- MacDonald, M. 1988. Traditional knowledge, adaptive management and advances in scientific understanding. In M.M.R. Freeman and L.N. Carbyn (eds.). *Traditional Knowledge and Renewable Resource Management in Northern Regions*. Edmonton: Boreal Institute for Northern Studies, 65-71.
- Malinowski, B. 1922. *Argonauts of the Western Pacific*. New York: Dutton.
- Madhav, G. 1985. Social restraints on resource utilization: the Indian experience. In J.A. McNeely and D. Pitt (eds.). *Culture and Conservation: The Human Dimension in Environmental Planning*. London: Croom Helm, 135-154.
- Marshall, D. 1986. Native resource management at a turning point? In *Native People and Renewable Resource Management*. Edmonton: Alberta Society for Professional Biologists, 23-28.
- Mulvihill, P. 1988. Integration of the State and Indigenous Systems of Wildlife Management: Problems and Possibilities. Unpublished paper, School of Urban and Regional Planning, Faculty of Environmental Studies, University of Waterloo.
- Nakashima, D. J. 1984. *Inuit Knowledge of the Ecology of the Common Eider in Northern Quebec*. Montreal: Makivik Corporation.
- Osherenko, G. 1988. *Sharing Power with Native Users: Co-management Regimes for Arctic Wildlife*. Ottawa: Canadian Arctic Resources Committee, Policy Paper No. 5.
- Polunin, N.V.C. 1985. Traditional marine practices in Indonesia and their bearing on conservation. In J.A. McNeely and D. Pitt (eds.). *Culture and Conservation: The Human Dimension in Environmental Planning*. London: Croom Helm, 155-179.
- Riewe, R. and L. Gamble 1988. Inuit and wildlife management today. In M.M.R. Freeman and L.N. Carbyn (eds.). *Traditional Knowledge and Renewable Resource Management in Northern Regions*. Edmonton: Boreal Institute for Northern Studies, 31-37.
- Rigby, B. 1989. Chairman, Environmental Technology Program, Arctic College, personal communication.
- Robertson, I. 1989. The contribution of land use planning to oil and gas development in the Northwest Territories. In F.T. Frankling (ed.). *Proceedings: Northern Hydrocarbon Development in the Nineties: A Global Perspective*. Ottawa: Carleton University, Geotechnical Science Laboratories, 37-41.
- Scott, C. 1979. Production and exchange among Wemindji Cree: equalitarian ideology and economic base. *Culture*, 11(3): 51-64.
- Scott, C. 1987. The socio-economic significance of waterfowl among Canada's aboriginal Cree: Native use and local management. In A.W. Diamond and F.L. Filion (eds.). *The Value of Birds*. ICBP Technical Publication No. 6, 49-62.
- Social Sciences and Humanities Research Council of Canada (SSHRC). 1983. *Community-based Research: Report of the SSHRC Taskforce on Native Issues*. Ottawa: SSHRC.
- Snyder, L.L. 1957. *Arctic Birds of Canada*. Toronto: University of Toronto Press.
- Stephenson, R. 1982. Nunamiut Eskimos, wildlife biologists and wolves. In F. Harrington and R.C. Paquet (eds.). *Wolves of the World. Perspective of Behaviour Ecology and Conservation*. Parkridge: New Jersey, 434-439.
- Theberge, J.B. 1981. Commentary: conservation in the North - an ecological perspective. *Arctic* 34(4): 281-285.
- T' Seleie, B. 1985. Baseline data: Dene knowledge of behaviour patterns in moose, caribou and fish. Unpublished Report, Fee-Yee Consulting Ltd., Fort Good Hope, NWT.
- Usher, P.J. 1981. Sustenance or recreation? The future of native wildlife harvesting in northern Canada. In M.M.R. Freeman (ed.). *Proceedings: First International Symposium on Renewable Resources and the Economy of the North*. Ottawa: Association of Canadian Universities for Northern Studies, 56-71.
- Usher, P.J. 1986. Devolution of power in the Northwest Territories: implications for wildlife. In *Native People and Renewable Resource Management*. Edmonton: Alberta Society of Professional Biologists, 69-80.
- World Commission on Environment and Development 1987. *Our Common Future*. Toronto: Oxford University Press.
- World Conservation Strategy*. Gland: Switzerland: IUCN, UNEP, WWF.

### 3. A COMMUNITY BASED CONSERVATION STRATEGY FOR THE BOWHEAD WHALE

K. J. Finley

Consideration of socioeconomic factors and human perceptions in the conservation of endangered species is often quiet limited (Yaffee 1982; Keller-t 1985), particularly when it involves indigenous people. Typically, endangered species protection programs emphasize biological assessments and technical solutions. Yet, in most cases, socioeconomic factors and political forces constitute the basis of the conservation problem. To some extent, this bias reflects the training and limited management imperatives of wildlife biologists and the hope for simple technological solutions to deal with complex (frustrating) socioeconomic and political problems. Perhaps more significantly, the biological and technological emphasis usually reflects an expedient response to political pressures that demand immediate remedial action rather than fundamental and long-term social and perceptual solutions (Kellert 1985).

These problems are especially acute in the Canadian arctic where wildlife research is often viewed as a harbinger of constraints on personal freedoms, one of the most basic of which is the right to hunt. Research is usually carried out in response to an obvious problem so that it becomes a management-by-crises situation (e.g., narwhals, belugas and walrus). Often, hunting restrictions (quotas and parks) have been imposed without full consultation with the communities involved, resulting in resentment and non-compliance (Finley and Miller 1982). The problem has been exacerbated by the language and cultural barrier between biologists and the Inuit; biologists are often ignorant of local ecological lore and therefore insensitive to local beliefs. It is often difficult, therefore, to arrive at a mutually credible consensus about the extent of the conservation problem and the need for appropriate management measures.

The problem of conservation of the bowhead whale (*Balaena mysticetus*) encompasses many of the basic and some unique predicaments of conservation involving northern people. The bowhead population of the eastern arctic was brought to near extinction at the turn of this century by the British arctic fishery. The population has shown no appreciable signs of recovery in spite of the fact that commercial whaling ceased over 7.5 years ago. It has been suggested that low-level hunting by Inuit, predation by killer whales (*Orcinus orca*), and habitat instability have contributed to the poor recovery (Mitchell and Reeves 1982). The population, believed to number in the low hundreds at most, is designated as endangered although it has been considered too sparsely distributed to warrant studies (Mansfield 1971). The most expedient way to deal with the conservation issue

has been to issue a total ban on hunting the whales. Despite this ban, the Inuit have demanded the right to hunt the bowhead and hunters have continued to take the occasional whale.

The "discovery" in 1978 of a significant concentration of bowhead whales at Isabella Bay on the east coast of Baffin Island marks the beginning of the following narrative. It concerns the history of involvement of local people, the Ukkumiut of Clyde River, in research on the bowhead whale and evolution of a community-based conservation strategy.

#### BACKGROUND

In 1978, Petro-Canada Exploration Inc. sponsored the Eastern Arctic Marine Environmental Studies (EAMES), an extensive scientific investigation of the marine environment of northwest Baffin Bay initiated in response to proposed oil and gas exploration (Sutterlin and Snow 1982). When the EAMES studies began, there was little published knowledge on the distribution and habits of marine mammals and seabirds in northwestern Baffin Bay. Although not officially part of the EAMES project, local people were consulted to a limited extent about the habits and distribution of marine mammals in the north Baffin area (e.g., Finley *et al* 1983a).

On the advice of David Piungituq, an elder and hunter living in Eglinton Fiord, an observation site was established in 1978 at Cape Adair to monitor the southbound migration of marine mammals along the northeast coast of Baffin Island. Piungituq stated that a significant movement of narwhals (*Monodon monoceros*) and bowhead whales could be seen in late September and early October from the coastal prominence known as Tallarutit. This proved true and the observational study was repeated in 1979, providing valuable information on the timing and magnitude of southern migration of marine mammals (Koski and Davis 1980).

In the same year, Apak Qaqqasiq, a hunter from the community of Clyde River drew attention to the existence of a major summer concentration of bowheads at Isabella Bay along the east coast of Baffin Island. This area was briefly surveyed from an aircraft in September 1979 and a significant number of bowheads were observed there (Davis and Koski 1980). However, Isabella Bay was not officially within the EAMES study area and no further observations were conducted.

The opportunity to study the bowheads of Isabella Bay was provided through the Whales-Beneath-the-Ice program

initiated by World Wildlife Fund (WWF) in 1983. The study was the first attempt to conduct field studies of the bowhead in the eastern arctic. The objectives of the WWF study were to develop a better understanding of:

- the biology, behaviour and habitat-use of the bowhead;
- the population dynamics and status of the stock; and
- the factors that significantly affect its potential for survival and recovery.

An important overall objective of the WWF project was to develop a cross-cultural understanding of the natural history of the bowhead and promote an awareness of the importance of Isabella Bay in the life scheme of the species.

Results from the first year of study (1983) were not auspicious for the continuation of the research. Only two whales were seen during the month long field study. To explain this disappointing beginning, we consulted with the elders in the community of Clyde River. We were advised that the absence of whales was due to unusually severe ice conditions and that we should be patient (Finley *et al* 1983b). Armed with this knowledge and some historic reports from the whaling era, we constructed a hypothesis to explain the whales' absence and rationalize funding for another field season. Documentation of the first North American breeding colony of dovekies (Finley and Evans 1983), a small seabird helped to assuage the program's funders. The existence of the dovekie colony was common knowledge that is available for the asking. Based on this shaky case, WWF agreed to fund another year's research.

To our great relief, the advice of the elders proved true. In 1984, we were richly rewarded with an exciting show of whales, the largest concentration observed in the eastern Arctic in modern times. The rest is history. The studies have continued for five seasons and much has been learned about the natural history of the bowhead through systematic observation and consultation with the local people. Isabella Bay is now recognized as critical habitat for a significant part of the endangered eastern Arctic population of bowheads (WWF 1986). Now, the objective is to develop a conservation strategy for the bowhead that has the support and involvement of the local people. Without their support, the future of any protection scheme for the bowhead cannot be considered secure.

Participation, consultation and information feedback have been key elements in stimulating community interest in the Isabella Bay bowheads. Apak Qaqasiq, a community leader and president of the local Hunters and Trappers Association (HTA) participated in the field studies every season of the five year study. He maintained contact with a large network of hunters along the east coast of Baffin Island through the portable HTA radio network. With the assistance of the HTA,

a sighting card, prepared in Inuktitut, was distributed to hunters in the communities of Broughton Island and Clyde River. From card returns and the HTA radio network, sightings of bowheads were mapped out by the hunters over a large area of the east Baffin coast. The HTA also selected one youth from the community to participate in the field studies. The student received instruction on natural history and camping skills from Qaqasiq and members of the study team.

Consultation and information feedback occurred during meetings with the HTA, casual conversations with community elders, programs on community radio, and presentations to school children. People who participated in the study received a T-shirt with a logo promoting Isabella Bay as "Home of the Bowhead". Progress reports on the research, prepared in Inuktitut, were presented to the HTA after every field season, and, in 1986, an illustrated booklet on the importance of Isabella Bay to the bowhead was distributed to communities in northern Baffin Island.

## PROJECT APPROACH

The present project, initiated by the Canadian Environmental Assessment Research Council (CEARC), was designed to assist in the evolution of the community-based conservation strategy by securing the participation of the community elders, incorporating their knowledge into the decision-making process and establishing a forum for the exchange of scientific and traditional knowledge. Community elders are respected members of Inuit society and gaining their approval and support is important in developing a community consensus. Consultation with the elders is essential to gain the knowledge important for conservation and for the avoidance of conflict. An additional goal of the project was to encourage participation of younger members of the community in the decision-making process.

The initiation of the CEARC project was very timely, coming at the end of a five year research effort, when the community, with the assistance of WWF, was working toward a consensus on a conservation plan. The HTA had already selected a special committee from the community examine conservation options and prepared a consensus report for public approval. To promote understanding of the issues, a field trip by boat to Isabella Bay was organized. This was followed by a general public meeting at which the committee presented their conservation plan for approval. Throughout this period, discussions or interviews were held with community elders, members of the HTA and the Hamlet Council.

## Interviews

In the context of this exercise, the word "interview" comes loaded with all the innuendo of a Larsen cartoon featuring native peoples and anthropologists. Perhaps I have avoided the



stereotype, but this is likely wishful thinking. Some of the questions posed were deliberately leading in an attempt to spark exchange and, undoubtedly, some of the answers were placatory.

Attempts were made to keep interviews casual and unobtrusive. Interviews were conducted with the assistance of an interpreter although my knowledge of Inuktitut is sufficient to understand the drift of conversation. To some extent lack of fluency was compensated for by having considerable experience in local natural history. Since 1974, I have conducted numerous studies on the marine ecology of the region and have travelled extensively with hunters. An attempt was made to allow conversations to flow along the lines of thought of the "interviewee", if they seemed so inclined. Often, however, the interviews became typical question and answer sessions. A compact tape recorder was used to record most interviews, but if the tape recorder seemed too intrusive or the hunter felt uncomfortable, it was not used.

Conversations were held with ten elders; these were considered to represent most or all of the elders in the community and certainly all those recognized and recommended by the community as being knowledgeable. Over fifteen hours of conversation were involved and half of this was recorded. Copies of the most interesting interviews were left in the school library archives. The interviews are briefly summarized below; the details are much richer than indicated. Also included are interviews with one elder, now deceased, recorded prior to the CEARC project.

#### *Paqaq Apaq*

Paqaq never lived at Isabella Bay (Igalituq) until she was an adult; she lived in Home Bay at Arvaqtuq (Place of the Bowhead Whale) and Qivituq as a child. She remembers that when she was growing up (at the time that the hunters Apaq, Koonieloosie and Qautuq were there) someone caught a bowhead whale from shore. The whale came very close to shore, and the Inuit men shot it, but it sank. When it sank, a lot of oil came to the surface.

Igalituq was known as a place where there were many whales, even after the whalers had gone. Igalituq and Arvaqtuq were richer than other areas in terms of animals, but when the bowheads arrived they scared the other animals away.

Paqaq has heard about the Scottish whalers. They took some people from this area and always ordered the Inuit around. The whalers took the maqtaq (skin) from the whales and put it in small boats to take to shore. The carcass was left in the water. Saturday is still called "sivatarvik" (biscuit day) because the Scottish would hand out biscuits to the people.

Before the Scottish there were American whalers. They had big boats and took mainly oil and maqtaq. The Inuit would

help drag the whale up the shore, and would get some maqtaq as well as the whale meat (neqinga). The best thing to eat was the cartilage. The whaling days were a happy time for the Inuit.

#### *Qillaq Enuaraq*

Qillaq camped in the Isabella Bay area once or twice, about twenty years ago, at a place called Qursunituq. She remembers seeing ringed seals and bearded seals there, but not bowhead whales. But that is probably because they left that camp before the ice cleared and the whales go to Isabella Bay later in the season. There are probably a lot of animals there because there's lots of food. The people never went hungry there.

Qillaq grew up near Kekerten Island in Cumberland Sound, and remembers two occasions, when she was a child, that Inuit caught whales at Kekerten and at Umanaqjuaq. The men caught them at the flow edge, where they had boats and probably whaling guns. They dragged the whale to shore to cut it up.

Qillaq does not remember eating the meat, but people did eat the maqtaq and the gums near the edge -- the baleen. The cartilage near the nose (nataquq) was very tasty. They probably also rendered some of the fat and put it in barrels for oil in their camp, and maybe also to send to the whalers. Qillaq's husband used the baleen for carving.

#### *Mary Qautuq*

Mary lived in Isabella Bay at Kusasiaq near Nuvuktiapik (Cape Raper). At that time, she had two children. There were three families there, including Koonieloosie, Ajalik Apaq, and Qautuq. Apaq was the camp leader (issumataq) and he advised the other hunters about the most productive areas.

The bowheads concentrated near Nuvuktiapik, but there were also lots of ringed and bearded seals, as well as walrus. There was a walrus haul-out-place (uglit) on the island. In the fall there were also lots of polar bears. And eider ducks came when the ice was disappearing.

Isabella Bay was a very productive place for seal hunting. Hunting at seal holes (aglus) was very productive so the hunters never had to go to the floe edge. They never went far at all; the seals were very close. The only trouble hunters had was during the winter when it was very windy.

People used to watch the bowheads slapping their tails on the water, but no one ever hunted them because they had nothing to hunt them with. The small things that the whales eat are called "illarait" (copepods), and the small black things, "tuluganaq" - little ravens (pteropods).

Mary knows nothing about whalers, although she heard some stories from her father about the whalers at Kekerten

(Cumberland Sound). There used to be whalers on the big island (Talagujaq); she has heard about the graves there although she has never seen them.

### *Joanassie Apaq*

Joanassie lived at Tikitqaq (near Alexander Bay) during the winter and at Rocknosser Fiord during the summer.

There have always been bowheads at Isabella Bay, although the numbers may change from year to year. They are found all the way from Isabella Bay around to the northern coast of Home Bay (Arvaqtuq). Killer whales sometimes attacked bowhead whales. When they attack one grabs the tail while one goes in from the top and one from the side. Bowhead bones, the ribs, are sometimes found on the shore cracked because the whale was attacked by killer whales.

Joanassie notes that there used to be walruses in Isabella Bay but that there are not as many as there used to be. People sometimes caught walruses near Nuvuktiapik (Cape Raper) when he was little and he heard that long ago there used to be a haul out place (uglit) near Bear-slide Island. There are several haul-out sites in Alexander Bay. The walruses seem to have abandoned Isabella Bay but not Alexander Bay.

During spring and summer, there were many bearded seals in Isabella Bay -- more than in Home Bay. They were often found behind Aultiving Island, possibly because it is calmer there. There were also more seals at the Isabella Bay floe edge. The seals eat amphipods (kinguit) there and occasionally copepods (illarait). Smaller animals like seals probably follow the larger whales to rich feeding areas, just like people to meat. The effect of the currents and slicking patterns that is noticed in the whale feeding area of Cape Raper is also found at Cape Henry Kater.

### *Nauja Tassugat*

Nauja used to live on Talaguj aq (Aultiving Island) a long time ago. Isabella Bay used to be known as "Ninginanga", a place that fills up with fog.

Talagujaq was the main whaling camp in Isabella Bay. The whalers had a look-out point, and once a whale was sighted, they put up a flag to notify the whale boats. The whalers would chase the whales in small boats with sails; their oars were tied to the boat so they couldn't be lost. The rope from the boat to the whale was looped around a post which needed to be cooled as the line payed out. In case the rope tangled, there was an axe-man ready to cut it. Sometimes the whales would pull the boats down, drowning all the men. Occasionally the whales were found a few days later, still tied to the boat.

After the whale was killed, the large ship would go out to bring in the carcass. The whale was cut up near the ship, with

huge knives and a mechanism for turning the whale. It took ten bowheads to fill a ship. Sometimes the ships would stay all winter if they were not full.

The harpooner would receive the thickest part of the baleen. The local Inuit also participated in the hunt and they got the meat. On Sivatarvik (biscuit day, being Saturday), the Inuit received biscuits, molasses and coffee.

Even before the whalers arrived, Inuit killed whales without using guns. They would use a small float (avatauq) and drogue (niutang) attached to the whale with a harpoon. It could take a day to kill a whale, continually driving the sharp end of a kayak paddle into it. The hunters would have to be very careful of the whale's tail when they approached it. The Inuit used the baleen (surqaq) for sled runners or for dragging things, as well as for snares for birds.

There were always lots of whales at Isabella Bay, presumably because there is a lot of food for them. They eat copepods (illarait) which are found where the ocean is deep. Even when the whalers were gone, the bowheads continued to return to Isabella Bay. The whales always used the same places -- they concentrated at Tallagujaq and at Igalituq. Nauja remembers one occasion when there were many whales in the shallow area near Igalituq, breathing very quietly. This was because there were many killer whales nearby. Killer whales strike at the ribs of bowheads to kill them.

The place where the whales feed is marked by an oily surface (uqsuqtuq). The oily places on the water can be seen where a fast current slows down suddenly -- as happens over the undersea trough near Cape Raper. "Ingitaniu katurninga" is the word for the oily lines where the current slows. That is where the copepods are concentrated by the current, and where the whales gather to feed.

### *Sakiassie Arreak*

Sakiassie passed through the Isabella Bay area as a child but not as an adult. He spent more time at Netsisujuk (Scott Inlet). Bowheads are also seen in that area -- as many as thirty have been seen there in the spring.

Ice affects the abundance and distribution of animals. The narwhals and bowheads show up sooner when the ice clears sooner. The abundance of seals does not vary much though, regardless of ice conditions.

Narwhals, bearded seals and ringed seals go deeper into the fiords, while bowheads stay at the mouths of fiords. Seals from deep inside the fiords are fatter, offshore seals are slimmer and show up only in the summer. The seals in the Clyde River area taste different than those further north near Pond Inlet, because the former eat amphipods (kinguit) whereas the latter eat cod (ogac). Seals near Clyde also eat a small fish, about three

inches long, that looks like cod but is called a quliligaat. There are not as many narwhal and beluga near Clyde because there are not as many cod and halibut.

### *Ashevak Palituq*

Ashevak was born near Broughton Island and lived near Pingnaraq in Clyde Inlet as a child. He does not remember Isabella Bay. He has heard about the bowheads there, but he has not seen them.

When he was young he heard about the whalers from the elders. The whalers had stations from Isabella Bay to Pond Inlet; they used to be located at points like Nuvuktiapik (Cape Raper), Dexterity Harbour, Cape Christian and Scott Inlet. The stations at Isabella Bay (Talagujaq) and Eglinton Fiord (Arviqtuyuq -- place of many bowheads) were the most important. Ashevak can identify places at Dexterity Harbour where there are old whalers' look-outs and sod houses, as well as some sites of shipwrecks. At Arviqtuyuq, there is an inukshuk (cairn) with a message in a glass bottle.

Animals have strong traditions just like humans. Animals' traditions don't change -- once an animal goes over a certain migration route or to certain places it will return, and others will follow and learn. That is why whales come back to Isabella Bay each year.

Ashevak was shown a picture of an unusual whale that has a pure white tail. This whale returns every year to Isabella Bay. We discussed its peculiar behavioral traits. He believed that it was likely the leader of the bowheads. The whale population seems to be increasing now, after not being hunted for a while. The whales here seem to be the only ones that are not being hunted.

People think that they can overpower animals, but it's probably not meant to be like that. The whalers are an example of that. Some people can get animals; some can't. A man might have bad thoughts and would not catch animals.

When one is alone, one can feel or sense more about the animals and their spirits. The problem now is that we live in villages and no longer have to be alone. If the Superior One made animals to survive, then they must have special spiritual powers.

### *Allooloo Qautuq*

Allooloo lived at Talaguj aq (Aulitiving Island) for one year around 1974, and also at Nuvuktiapik (Cape Raper). His parents told him a lot of stories about the whalers, but he does not remember a lot of them. He knows that the whalers took refuge at Arctic Harbour (Talagujaq) and that they cut up whales there. There are look-outs on the eastern tip of the island, and on two small islands at the mouth of the bay. As

well, there was a whalers' lookout at Nuvuktiapik; the biologists have built it up with more stones and use it for their own lookout now.

Allooloo camped on the southern point of Talagujaq once, and walked along the southern coast during the summer. He found a metal box and has always wondered if it might have contained a Scottish treasure. He was told that a ship went down in that area. He also remembers being told about one unlucky captain who sank three ships in one summer.

Allooloo heard from his parents that when the whalers arrived in the summer, the Inuit celebrated, mostly because of the new supply of tobacco, sugar, tea and maqtaq. The whalers would stay for several months, arriving in July when there was still lots of ice and leaving around November. They were very efficient at killing and processing the whales, so they seldom had to stay over winter to obtain a full cargo.

In the summer that he lived at Isabella Bay, Allooloo saw many whales near Nuvuktiapik and at Qusasiaqtaalik; there were not so many in the southern part of the bay. They were often very close to shore. He has been told that it is good place to feed. Narwhals and seals are also abundant there. They didn't count whales in those days, so it is hard to say if there are more now. They did notice though, that there were some whales with white tails, which biologists think is a sign of an older whale.

Allooloo has also seen bowheads at Niaqurna (in Home Bay). In August 1974, he saw a very big whale at Tikirkat, with two calves. They stayed there for four days. The hunters almost shot the calves, thinking they were narwhals, but then the mother surfaced. One can also see bowhead whales at Cape Christian in August, at Eglinton Fiord and two places along the coast north of Clyde called Niaqumaluk (Big Head -- referring to prominent forelands). The whales don't stay around once the ice forms.

### *Ipeelie Qillaq*

Ipeelie lived at Isabella Bay for a year in the 1960s. He recalls seeing many whales in the shallow area near Nuvuktiapik during August, playing and slapping their tails. To the west of Nuvuktiapik there are sand bars -- you can see this through seal holes in the ice. East of this the water gets quite deep. He has seen whales feeding, with their mouths open, in both the deep and shallow areas near Nuvuktiapik.

During the summer that Ipeelie was there, there were many killer whales and seals around as well. The deep area is also rich with other sea mammals, but they will retreat to the shallow area when killer whales appear. In September, there are many seals at Isabella Bay. There used to be many walrus there -- Ipeelie has seen them come out of breathing holes in the solid ice. They are very sensitive to the sound of an

outboard motor.

When the ice is breaking up, that's when there are lots of whales. Once in July, Ipeelie was following the floe-edge going south and he saw many bowheads moving north through cracks in the ice. When the ice came back, there were no more bowheads around. Where did they go?

Bowheads have always returned to Isabella Bay, especially around Cape Raper. They would arrive when the ice was gone. Sometimes, there were so many whales they would keep everyone awake with their loud noises. Sometimes, the people were afraid to go seal hunting because there were so many whales. They would slap their tails, making loud sounds like a big gun. Often, they would leap out of the water making loud splashes. Once, Apaq saw a whale leap completely out of the water and enter head first. Once, he believes he saw a whale giving birth -- it stayed on the surface for a long time and many whales gathered around it.

The bowheads never go deep into the fiords like narwhals. They seem to stay in the shallow area near Cape Raper. Apaq has also seen bowheads along the coast near Cape Henry Kater and in Home Bay, but not so many as at Isabella Bay. Perhaps they stay close to shore because of killer whales, although he has never seen killer whales at Isabella Bay.

#### *Natanine Kautuq (deceased)*

Natanine spent much of his life in camps around Isabella Bay and farther south in Home Bay.

After the ice left, the bowheads would return to Isabella Bay from the direction of the open sea (Ikirq -- Baffin Bay). In summer, you would find most of them around Isabella Bay, but some in Home Bay too. Sometimes, they are seen around the mouth of Clyde Inlet, but not in large numbers.

Once, bowheads appeared in large herd, like belugas, at Cape Raper, where the water is shallow. Perhaps they were hiding from killer whales.

Isabella Bay is the place where most of the whaling was done. After every whaling trip, they would return to Arctic Harbour (Talagujaq -- Aulitiving Island), and also to Cape Raper. The big ships were anchored there -- the ships with masts and ropes to put up a sail. On the longest mast, a barrel was attached where a person was stationed as a lookout for whales. Once the spotter saw a whale, he would alert the crew who would run to their small boats, then row after the whale.

He has heard that the most dangerous moment came when the whale was harpooned. The harpoon line was coiled up in the boat. When the whale was harpooned, it would drag the boat behind at great speed. The rope would whine in a terrible way from paying so fast, and the boat would fill with smoke

as the rope wrapped around the bollard. It must have been dangerous to be in the way of that harpoon line.

Once a whale was killed, the ship would pull it to shore where it was flensed. He heard about one ship with a captain who was one of the better whalers -- not so much the captain perhaps but because he had a good crew. He would bring in two bowheads along the ship at one time.

The Inuit often worked with the whalers and the whalers lived amongst the Inuit in camps. His father worked with the whalers.

#### *David Piungituq*

David is the only hunter in the Clyde area who has always lived on the land. He still lives in a camp at Arviqtuyuq (place of many bowhead whales) in Eglinton Fiord.

Bowheads still return to Eglinton Fiord when the ice begins to break up. Normally they remain at the mouth of the fiord, especially around Erik point. Sometimes, they are chased into the fiord by killer whales. Killer whales attack the bowhead in packs -- each member has its own duty. At first, they follow on the flanks of the bowhead. The bowhead would try to keep them at bay by lashing the water with its flukes, but eventually the killer whales would grab its flippers and then its tail. The killer whales always had a very large leader who would finally kill the bowhead by slamming into its stomach. The killer whales apparently ate all the blubber off the bowhead and then let it sink -- since he never saw a carcass afterwards. He has seen killer whales attack bowheads on three occasions; the last time was about 1959 in Sam Ford Fiord.

When bowheads are not pursued by killer whales, they spend much of their time playing jumping out of the water and making loud noises -- especially the young ones. Bowheads don't play like this when they are travelling alone.

Piungituq has heard about the white-tailed whale at Isabella Bay and believes that it is a leader of the bowheads. He related a story about the appearance of a white-tailed char that foretold of increased productivity and good fishing. Perhaps this was the same for the bowhead.

In some years, there have not been many bowheads because of the ice. It's like that -- some years lots, sometimes nothing. It seems strange though that when the biologists come to look for animals, the animals go away as if to make Inuit look like liars.

#### The Field Trip

During the brief open-water season, Isabella Bay tends to be isolated from the activities of the community of Clyde River because of sea and ice conditions. The nautical route is 110

kilometers, of which over 80 kilometers is along an exposed outer coast with no harbourage. In fact, most boat traffic in late summer is conducted north of Clyde River to more productive hunting areas. Thus relatively few people from the community of **Clyde** are familiar with the area during this season. Only elders, such as Nauja Tassugat, Peter Koonieloose, and Natanine Kuatuq (now deceased), who used to live in the area year-round, can claim to have much experience with natural phenomena during the open-water season. Apak Qaqqasiq, who lived in the area between 1978 and 1981, and who worked with the WWF study team between 1983 and 1986, has the most extensive experience in the area.

A field trip to Isabella Bay was scheduled for the end of August when ice conditions permitted travel. A community-owned vessel, a 13 metre scallop dragger, was chartered for the occasion. It is the only seaworthy vessel of its size in the area. It was equipped with two echosounders, radar and marine radios. The boat was rigged with winch hardware and nets for conducting zooplankton sampling.

The trip included members of the special committee on Isabella Bay who were selected by the Hunters and Trappers Association. Apak Qaqqasiq, vice-president of the HTA, was chosen as the group leader. The trip also included elders, Nauja Tassugat and Peter Koonieloose, and some younger people who wished to attend.

The field trip began on 21 August and ended on 25 August.

**Day One:** The first day was spent in transit to Isabella Bay; dense pack ice in the mouth of Clyde Inlet caused detours. Several bowheads were encountered in the vicinity of Cape Raper. For most of the younger members of the field trip, it was their first experience with bowheads. This provided a positive image about the importance of the area for bowheads. Camp was established at Cape Raper, site of the WWF base camp in previous years.

**Day Two:** Excellent weather prevailed and there were several bowheads close to shore, engaged in social behaviour. The morning was spent looking at the whales through telescopes and recording their underwater sounds from a kayak.

In the afternoon, the group ascended Balaena Lookout, the WWF observation site, situated on a large hill near Cape Raper. The weather was calm and visibility was superb. There were several whales in the immediate area engaged in social activity, and an extensive field of pack ice was drifting south off the coast. The surveyor's theodolite, with a high-powered scope, was set up and everyone took turns examining the whales, the drift of ice through the offshore feeding area, positions of icebergs, extent of shallow areas, etc. The

extent of important feeding and socializing habitat was outlined and a review of the major findings of the WWF project was presented in Inuktitut and English. The elders who were able to ascend the hill, talked about the whales and the places where Inuit used to live and hunt. In the evening, a seal was killed and an informal banquet was held.

**Day 3:** Strong winds throughout the morning delayed plans to conduct an oceanographic survey with the boat. In early afternoon the winds dropped to calm and we departed in the boat to examine the NE Trough, the main feeding area of the whales. The area was profiled with the hard-copy and video- display echosounders, which revealed the underwater characteristics of the trough and the continental slope. The echosounders also showed the distribution of plankton layers. Vertical hauls with zooplankton nets demonstrated the abundance of copepods were found almost exclusively in waters beyond 100 meters. The study techniques and the important features of the area were explained in detail by Apak Qaqqasiq.

In the evening there were several whales close to shore near Cape Raper. The younger members of the group tried out the kayaks and one of them paddled close to whale, his first such experience.

**Day 4:** Poor weather prevailed with fog and light snow. At noon the boat departed for Arctic Harbour (Talagujaq) on Aulitiving Island. The group explored much of the area on foot and gathered late in the afternoon at the site of the whalers graves. Nauja Tassugat talked about the whaling era as its history had been told to him. In the evening, the entire group met to talk about the type of protection plan they envisioned and the problems they foresaw with tourism.

## Public Meeting

A public meeting was scheduled soon after the field trip. However, this proved inconvenient for the community as many people were out hunting caribou. Furthermore, the special committee required additional time to organize their conservation plan. The meeting was re-scheduled for 13 October. About one hundred people attended the meeting, which was held in the public school. This was an exceptional show of interest -- about one quarter of the population of Clyde. The meeting was conducted in Inuktitut and followed an agenda established by the special committee. Joëlie Sanguya was chairman. Apak Qaqqasiq talked about his involvement in the bowhead studies and his concerns about the area. I presented a slide show on the Isabella bowhead project and a premiere showing of a video film of the whales taken by David Poisey, an Inuk film maker from Pangnirtung.

Joelie Sanguya introduced the members of the special committee and presented the committee's recommendations for a conservation plan for the area. This plan called for the establishment of a whale sanctuary for the core bowhead habitats of Isabella Bay, surrounded by a buffer zone (a Biosphere Reserve). The forum was then opened for discussion and several elders and members of the HTA presented their views. Finally, a vote was taken on community approval of the committee's conservation plan. Affirmation was unanimous. Joanassie Apak, President of HTA, thanked the committee and expressed HTA support for the conservation plan.

## REVIEW AND DISCUSSION

There is a wealth of undocumented ecological knowledge in the minds of Inuit hunters who have spent much of their lives as seasonal nomads along the east coast of Baffin Island. The knowledge is both experiential and based on oral history. Much of the experiential knowledge concerning the natural history of the bowhead is one generation removed from the elders -- many of them reported that their fathers and grandfathers were involved in the British whaling era. Despite this, the history survives with remarkable clarity in the minds of some of the elders. This verbal history, together with the actual experience of the elders, is an important contribution to the bowhead story; the narratives lend support to many of the research findings. Among other things, they identify the most productive whaling grounds at the mouths of certain fiords (e.g., Eglinton Fiord and Clyde Inlet) and demonstrate the importance of Isabella Bay to the whaling industry. They confirm that the whales are traditional in their occupation of certain habitats and that they return with regularity to Isabella Bay. They reveal the role of ice in the migrations of the bowhead and of killer whales as significant predators.

Traditional knowledge of bowhead biology is certainly incomplete compared to knowledge of other marine mammals, such as the ringed seal. Because of the rarity of bowheads, few people have had experiences with them in recent times. Also, because bowheads assemble in outer coastal areas late in the season, when high sea states prevail, the likelihood of encounters is lessened. At that time, the people are usually inland hunting caribou. Finally, the use of power boats has become an effective barrier to encounters with bowheads, since they are highly sensitive to underwater noise and flee from boats at long ranges.

Documentation of the verbal history of the elders reveals a rich vocabulary of natural history concerning the bowhead that is in danger of being lost. Few of the younger people know about ingutuk (young bowhead), surqaq (baleen) and illarait (copepods), or where Talagujaq (Arctic Harbour) is located, or why Saturday is called Sivatarvik. Unfortunately, very little of the knowledge concerning the natural history of the region is being passed on to the younger people. Of course, this is the

lamentation of elders in most societies, but in traditional Inuit society, where knowledge is absorbed through experience and necessity, there is no formalized method of instruction. Perhaps loss of vocabulary is an inevitable part of the acculturative process. Yet, language serves as a touchstone to cultural identity and pride, and will serve as an important bridge to a positive future association with the bowhead whale.

One of the most gratifying aspects of the interviews and discussions was realization of the extent to which research results have become incorporated as common knowledge. The importance of the southward-flowing Baffin Current and its role in zooplankton accumulation and bowhead feeding has been recognized. The importance of sound in bowhead communication and their sensitivity to underwater noise has been emphasized by the HTA in discussions on the potential impacts of tourism and shipping. The fact that the bowheads of Isabella Bay are primarily large adults and that they are seasonally segregated from the population that enters Lancaster Sound has helped to broaden the geographical scope of local knowledge. Knowledge that older whales attain white tails and that one particular individual (which the school children named Allaluk, the Big Stranger) returns annually to Isabella Bay, fits with Inuit mythology about leadership and good omens. With knowledge comes a sense of being in control.

If the unanimous show of local support for the Isabella Bay conservation plan is a valid measure of "success" in engendering a community-based conservation attitude, then the CEARC project can claim to have been successful. Indeed, the outcome of the community meeting is precedent setting. The "ingredients" behind the process are many:

### Timing

Undoubtedly, the timeliness of the project was an important factor in its success. Securing the involvement and support of the elders came at a crucial time in the decision-making process. Their understanding and support was critical in creating consensus at the public meeting. Also, respect for a local sense of timing and exigency is a useful attitude to cultivate. If local people are to develop a feeling of responsibility for the conservation strategy, they cannot be pushed by agendas outside their sphere of control. Intervention at the wrong moment can jeopardize the foundations of a conservation policy.

### Continuity

The cast of characters involved over the six year period has remained relatively constant. Continuity of personnel promotes accountability. Scientists are often viewed as "hit and run" artists who leave others to deal with the management issues they have raised. There is now a danger that securing of community support for a whale sanctuary will be viewed as

the end conservation product of the responsible agencies. In the bangs-for-your-bucks arena of conservation politics, this is a common shortfall of many programs. Obviously, there is still much work that needs to be done to assist the community in implementing their plan.

### Education

Conservation education must allow for the integration and use of folk knowledge and permit a permanent redistribution of the research results. Respect for local beliefs and knowledge is of paramount importance in this process. Conservation education should be delivered in a manner that emphasizes common goals and encourages mutual respect. The process can be useful in illustrating the relationship between regulatory policy and local self interest, and in developing a broader understanding of the geographical scope of conservation policy. Policies are more likely to be accepted if the reasons for them are presented in terms that are precise, concrete and unambiguous. A simple conservation rule that has local adherence and support will probably accomplish more than a complicated plan that has no support.

### Participation

The approach taken throughout the research project has been based on the premise that close involvement of local people is fundamental to the foundation of a sustainable conservation strategy and that such a strategy, if it is to be successful, must be firmly established at the grass roots level. Meaningful participation in research is essential if the Inuit are to develop an understanding of the research methodologies and their application in developing management strategies. Participation in research is necessary to bridge the cultural gap between local knowledge and applied science, and to provide a mutually credible basis for the development of regulatory policy.

### Politics

Recognition must be given to the political role of organizations, such as the Hunters and Trappers Association and Hamlet Council, in community decision making.

### Pride

Cultivation of pride in a local natural heritage site, such as Isabella Bay, is important in stimulating interest and action in the community. Promotion of Isabella Bay as "Home of the Bowhead" seems to have been successful in this endeavour. "Allaluk", the Big Stranger, has become well known to many people in the community; often I was asked whether the whale made an appearance during this study season. Also, for the first time, the bowhead has been incorporated into the artistic imagery of the local people; in 1988, the Igutaq Group, an

artists' cooperative in Clyde, produced a variety of prints of the bowhead.

### REFERENCES

- Davis, R.A. and W.R. Koski. 1980. *Recent observations of the bowhead whale in the eastern Canadian high arctic*. Report of the International Whaling Commission, 30: 439-444.
- Finley, K.J. and G.W. Miller. 1982. *The 1979 hunt for narwhals (Monodon monoceros) and an examination of harpoon gun technology near Pond Inlet, northern Baffin Island*. Report of the International Whaling Commission, 32: 449-460.
- Finley, K.J. and C.R. Evans. 1983. First Canadian breeding record of the dovekie (*Alle alle*). *Arctic*, 37: 288-289.
- Finley, K. J., G. W. Miller, R.A. Davis and W.R. Koski. 1983a. A distinctive large breeding population of ringed seals (*Phoca hispida*) inhabiting the Baffin Bay pack ice. *Arctic*, 36: 162-173.
- Finley, K.J., C.R. Evans and R.A. Davis. 1983b. *Evaluation of the Importance of Isabella Bay, Baffin Island, as Summer Habitat for the Endangered Bowhead Whale*. Report by LGL Ltd. to World Wildlife Fund, Toronto.
- Keller-t, S.R. 1985. Social and perceptual factors in endangered species management. *Journal of Wildlife Management*, 49: 528-536.
- Koski, W.R. and R.A. Davis. 1980. *Studies of the Late Summer Distribution and Fall Migration of Marine Mammals in NW Baffin Bay and E Lancaster Sound, 1979*. Report by LGL Ltd. for Petro-Canada Exploration Inc., Calgary.
- Mansfield, A. W. 1971. Occurrence of bowhead whale or Greenland right whale (*Balaena mysticetus*) in Canadian arctic waters. *Journal Fisheries Research Board of Canada*, 28: 1873-1 875.
- Mitchell, E. and R.R. Reeves. 1982. Factors affecting abundance of bowhead whales, *Balaena mysticetus*, in the eastern arctic of North America, 1915-1 980. *Biological Conservation*, 22: 59-78.
- Sutterlin, N. and N. Snow. 1982. Introduction to the Eastern Arctic Marine Environmental Studies program. *Arctic*, 35: iii-iv.
- World Wildlife Fund (WWF). 1986. *Whales Beneath the Ice: Final Report, Conclusions and Recommendations regarding the Future of Canada's Arctic Whales*. Toronto.
- Yaffee, S.L. 1982. *Prohibitive Policy: Implementing the Federal Endangered Species Act*. Cambridge, Mass.: MIT Press.

## 4. COMMUNITY IMPACT ASSESSMENT FOR OLD CROW, YUKON

**Nancy MacPherson and Gladys Netro**

The objective of this paper is to define a community-based approach to environmental and socio-economic impact assessment that reflects the traditional and present-day values of the community of Old Crow, Yukon. After outlining the context for this approach, the report first provides a critical review of conventional impact assessments of the Old Crow community. This process, secondly, is contrasted with the community's own approach to planning and assessing the resource base upon which it depends. Several sets of indicators are derived from community goals and aspirations in support of this approach. We conclude with suggestions for recasting environmental assessment approaches to make them more sympathetic to community concerns.

### THE COMMUNITY OF OLD CROW

Old Crow is a small, remote community of 300 Yukon Indian people, who used to be called Loucheux and are now called Kutchin or Vuntat Gwich'in. Speaking Loucheux, the Vuntat Gwich'in are part of the large language family called Athapaskan. The Old Crow Band is one of thirteen Yukon Indian Bands totalling approximately 7,000 people. Old Crow is by far the most northerly in location, and the most isolated in terms of roads and transportation services. All other present-day Yukon Indian communities are accessible by road.

Archaeological evidence suggests that the northern Yukon was home to the descendants of the Loucheux as far back as 25,000 years ago. At Klo-Kut, on the Porcupine River, archaeologists have found material going back to about 800 AD and continuing to the early historic period. Older people of Old Crow remember that Klo-Kut was one of their parents' or grandparents' villages, and they tell exciting stories about it.

Situated 80 miles north of the Arctic Circle on the banks of the Porcupine River at the mouth of the Old Crow River, the people of Old Crow are dependent on the renewable resources of the Old Crow Basin - an area north of 67 degrees north latitude that includes the northern Porcupine Plain, adjacent portions of the Porcupine and Arctic plateaus and the plateau portion of the British Mountains. The subsistence economy of Old Crow is based on hunting, fishing and trapping, supplemented by the gathering of wild berries and plants. Major game animals are caribou, moose, beaver, rabbit and muskrat. Of particular importance is the Porcupine Caribou Herd, upon which the residents of Old Crow depend heavily for meat. Approximately 90% of the community's country

food is caribou meat. The estimated annual substitution dollar value for caribou meat in Old Crow, based on four years of data, is \$428,661.

In the spring, muskrats and caribou are harvested. During the summer months, people fish for whitefish and chinook as well as chum and coho salmon. Throughout the fall months, caribou and waterfowl are harvested to supplement the food supply for the winter months. In the period 1980 to 1983, the average annual value of furs to Old Crow was \$85,372, of which muskrats and marten were the largest portion.

Numbering close to 140,000 animals, the Porcupine Caribou Herd migrates between the Alaskan North Slope and the north slope of the Yukon. The coastal plain of both jurisdictions are critical calving areas. Also of critical importance to the lives of people in Old Crow is the area called Old Crow Flats. As part of the unglaciated terrain of the northern Yukon, Old Crow Flats is recognized as an important breeding ground for ducks, geese and swans. As many as 500,000 waterfowl are estimated to use the flats in an average year. The largest concentrations of muskrats in the Yukon occurs in Old Crow Flats, and spring 'ratting' is an important traditional event.

Traditionally, the Vuntat Gwich'in people lived their lives around annual migratory cycles of the caribou and fish, along with the gathering of plants. The book *Part of the Land, Part of the Water*, by anthropologist Catharine McClellan (1987), documents the history of Yukon Indian people and describes the yearly round in detail.

Although still heavily dependent on the harvest of caribou, fish and birds, the people of Old Crow currently supplement their income through seasonal wage employment in fisheries and forestry work. There is some full time employment in the schools, nursing station, airport, the local co-op store and the office of the Indian Band. Handcrafts made from locally tanned caribou and moose hides, as well as furs, are an important source of income for many women in Old Crow.

Since contact with European traders and subsequent missionaries, Old Crow has been faced with a growing number of social problems related to increasing conflicts with white culture and loss of traditional customs and identity. Encroachment of industrial activities has created development pressures throughout the north slope of the Yukon and Alaska and the Beaufort Sea Region. The discovery of oil and gas at Prudhoe Bay, Alaska, in 1968 and the subsequent expansion



of hydrocarbon and support activities into the Beaufort Sea region has created pressure to open up the Alaska portion of the calving grounds of the Porcupine Caribou Herd to oil and gas exploration. This development, coupled with renewed interest in the Mackenzie Valley Pipeline to export natural gas to the United States, has rekindled the fear that a pipeline across the North Slope of the Yukon to connect with Alaska oil and gas interests may become a reality.

Another major threat to the renewable resource harvesting of northern peoples is the anti-trapping lobbying currently underway by animal rights groups. Fur prices have dropped markedly in the past few years, partly as a result of their efforts. Recent announcements by the Department of National Defence to upgrade the North Warning System have also alarmed residents of Old Crow. A major installation for the North Warning system was planned near the community of Old Crow; however, the community objected not only to the actual facility but what they perceive to be increased militarization of the North. The facility has since been relocated.

Residents of Old Crow have realized that despite thousands of years of occupation of the northern Yukon, their future and way of life on this land is no way guaranteed. Pressures from industrialized development, the animal rights movement, pollution and social problems threaten the future integrity of the community. In an attempt to define their future as a people and to ensure the survival of their culture, language and customs, residents of Old Crow have participated in several major initiatives that help put into practice the traditional knowledge, values and practices that sustained their ancestors for centuries. These include: the Yukon Indian Land Claim Settlement, the Old Crow Community Planning Project, and an Old Crow Conservation Strategy.

The ideas and concepts for community impact assessment in Old Crow presented in this paper have been developed through the forum of the Community Planning Project. This project grew in part from a growing pressure by increased development concerns in the northern Yukon, but also from a concern to be better prepared in identifying viable options for the future survival of the Vuntut Gwich'in people. The project is attempting to base the Community Plan on the values and traditions that have worked in the past for the Vuntut Gwich'in.

In 1985, the people of Old Crow decided to hold a special gathering at Klokut, seven miles up the Porcupine River from Old Crow, to discuss issues then facing the community and to decide on a course of action for the future. The Klokut area has special significance for the people of Old Crow, since their ancestors traditionally gathered there in the fall for fishing, hunting, feasts and special ceremonies.

At the 1985 Klokut gathering, elders shared their knowledge of how decisions were made long ago and concerns

about the way their community was changing. Old Crow families and younger people took this opportunity to learn from their elders and express their views on the future of their community. The stories that elders told at the Klokut gathering have been documented and form the basis of the Old Crow Community Planning Project. The values expressed have been reflected in the section of this paper entitled Old Crow's Approach to Impact Assessment.

## IMPACT ASSESSMENT AND THE COMMUNITY OF OLD CROW

The community of Old Crow is no stranger to impact assessment. In the early 1970s, Canadian Arctic Gas Pipeline Ltd. proposed a pipeline down the Mackenzie Valley and across the North Slope of the Yukon, joining the Prudhoe Bay oil field with the reserves of the Mackenzie Delta. Had the pipeline been approved, it would have crossed the North Slope of the Yukon and the calving grounds of the Porcupine Caribou Herd. On the recommendations of Mr. Justice Thomas Berger, Commissioner of the Mackenzie Valley Pipeline Inquiry, a ten-year moratorium on pipeline construction in the Mackenzie Valley was implemented. Berger (1977) also recommended against development on the North Slope of the Yukon because of the outstanding environmental values of the area. In his view, a pipeline across the Northern Yukon *would entail irreparable environmental losses of national and international importance.*

Impact assessments of the community of Old Crow and of the North Slope of the Yukon were carried out by Canadian Arctic Gas Pipeline Company Ltd. for submission to the Mackenzie Valley Pipeline Inquiry. Those assessments were far from acceptable to the people of Old Crow. Major differences were immediately apparent between the way in which the pipeline company's consultants viewed the community of Old Crow and the way in which Old Crow residents viewed their community and their relationship to the land. In addition, there were major differences in the perception of the objectives of impact assessment. These differences in perception and approach have been used along with the material from the Community Planning Project as a starting point for this report.

To illustrate these differences in perception, we need only examine the text of the impact assessment of the community of Old Crow carried out for the Canadian Arctic Gas Pipeline Company Ltd. The socio-economic assessment of Old Crow by Gemini North Ltd. (1974) in their report *Social and Economic Impact of Proposed Arctic Gas Pipeline in Northern Canada, Book 1* presented the community in the following manner:

*Old Crow, Yukon, is a myth. According to the myth, Old Crow is a tiny Indian settlement where people live off the land, pursuing traditional hunting, trapping and*

*fishing activities and discouraging white intruders. In fact, Old Crow is a wage employment oriented community, with only two full time trappers. It has been the centre of oil and gas exploration activity for nearly a decade and probably receives more visitors than any other native community in the study region with the possible exception of Tuktoyuktuk. Without oil and gas exploration, the settlement would have no viable economic base. (p. 3.57).*

*In terms of socio-economic impact, it is worth noting that the air strip was being built at the request of residents at the time when they were also asking the Department of Indian Affairs and Northern Development to preserve and protect their traditional economic activities. (p. 362).*

*It is an observed fact that given the choice between living off the land on a permanent basis and working full-time or part-time in a wage earning job, more northerners are opting for wage employment. (p.371).*

It is apparent from both the attitude and content of this major impact assessment that the researchers had little understanding or appreciation of the traditions and cultural context of the Vuntut Gwich'in people of Old Crow. It is not difficult to understand why the people of Old Crow were deeply offended to hear their community and way of life characterized in such ethnocentric and simplistic terms.

The overly simplistic view that northern communities should have to "choose" a way of life, -- either "off the land" or from wage employment -- is a common theme running through many impact assessments of northern peoples. The desirable situation for many northern peoples is to be able to combine cash income with subsistence activities.

Assumptions made by outside consultants that if, in any one year, native people did not "use" the land (i.e., did not actively hunt, fish or trap in an area) then that land must not be of any real value to them, fails completely to take into account the historical patterns of native land use, cycles of animals and the need for native people to harvest what is needed at the time.

The lack of understanding of the bush economy, and the subsequent lack of any real value attributed to subsistence activities, pervades many impact assessments of northern regions. In a chapter discussing the economic base of Mackenzie Valley communities, consultants for the pipeline company stated *other communities, such as Fort Franklin, have no apparent economic base and yet they continue to remain socially and economically viable* (p. 149) as if it was a complete mystery to them how these communities had possibly managed to exist for hundreds of years.

Another illustration of this lack of understanding of northern peoples and northern economies is the erroneous assumption, often made in impact assessments, that northern communities need "jobs" and that, without the jobs offered by the particular project in question the community will be lost. This assumption fails to see that what many people need in communities like Old Crow is "cash" to supplement their land based activities, and that cash could come from many sources, such as harvester support programs, renewable resource ventures, tourism and so on. People often work at whatever jobs are available at the time until they have enough cash to supply themselves and their families with skidoos, boats and other useful equipment. They then quit the job, often to the bewilderment and frustration of the company who assumed they were doing people a favour by bringing jobs into the community.

The most recent impact assessment experience for the people of Old Crow occurred in 1980 when Gulf Canada proposed the establishment of a deep water port at Stoke's Point on the north Yukon coast, accompanied by the development of a large gravel quarry by Kiewit and Sons Development Ltd. Both these developments were located in the migratory and calving areas of the Porcupine Caribou Herd. Old Crow and the northern Yukon again were subject to assessment, although not as comprehensive as the Canadian Arctic Gas Pipeline Company assessment of the 1970s.

The assessments focused on the technical engineering aspects of the project, failing to recognize the calving grounds of the Porcupine Caribou Herd as a crucial link in the social, cultural and economic well being of the people of Old Crow. The assessment treated the project as if mitigative measures could compensate for any potential losses incurred as a result of the project. The people of Old Crow tried to point out that it would be impossible to compensate their community for any loss in productivity of the Porcupine Caribou; for without the caribou, the people of Old Crow would not survive.

In Northern Frontier, Northern Homeland, Thomas Berger says *the culture, values, traditions of native people amount to a great deal more than crafts and carvings. Their respect for the wisdom of their elders, their concept of family relationships, their willingness to share, their special relationship with the land - all of these values persist today, although native people have been under almost unremitting pressure to abandon them* (Berger 1977:22). All Canadians take pride in the fact that the Canadian oil and gas industry and its engineers lead the world in the development of technology for the recovery of oil and gas in arctic waters. But the paradox is that we are limited in our ideas of northern development. *We need a broader definition of development, one that encompasses not only industrial activity but the strengthening of the traditional subsistence economy* (Berger 1977:8).

In summary, past impact assessments involving the people of Old Crow have failed to recognize these things:

- Historical patterns of Vuntut Gwich'in land and resource use and the significance of this traditional knowledge, including spirituality and mythology, in present day life.
- The goals and aspirations of the Vuntut Gwich'in people, as expressed by the community of Old Crow.
- Alternative economic development initiatives or potential in the region, such as smaller scale renewable resource ventures and tourism.
- The crucial interdependence of the people of Old Crow with the rich ecosystem of the north Yukon.
- The social, cultural, spiritual and economic "value" of subsistence and land-based activities to the people of Old Crow.
- The legitimate claim, as reflected in the Yukon Indian Land Claim Framework Agreement, of the people of Old Crow to the land and resources of the northern Yukon, and the rights flowing from this to participation in the control and management of the northern Yukon.
- The cumulative effect (social, economic, cultural and political) of many small changes/projects brought about by the industrialization process.
- The need for the community to be more influential in the learning process of its young people and the importance of practising the traditional way of life while benefitting from the modern ways.

## CONVENTIONAL IMPACT ASSESSMENT

The discussion in the previous section is not meant to imply that conventional impact assessments are of no use. On the contrary, much of the technical impact assessment work conducted by the Canadian Arctic Gas Pipeline Company in the Mackenzie Valley and the North Slope of the Yukon has contributed to valuable baseline data for these areas. What is at issue here are the assumptions made concerning the questions asked and the data collected in the process of impact assessment, and more importantly, the values attributed to data in arriving at decisions. The determination of impacts is not a technical exercise, but a profoundly political exercise. *There is a line below the bottom line, and it is for value judgments that anyone can read. It is impossible and undesirable to separate scientific, technical and economic considerations from their social and environmental context. We must always*

*consider the untidy web of moral and ethical considerations into which these judgments inevitably lead.* (Berger, 1977).

Most conventional impact assessments approach the exercise of assessment from a sectoral perspective, dissecting the status of various components of the biophysical and socio-economic environment of the region/community. This is illustrated by the environmental and socio-economic impact assessments of Old Crow, as well as communities in the Mackenzie Valley, carried out by the Canadian Arctic Gas Pipeline Company.

The following table (Table 1) is an abbreviated version of the Environmental Impact Assessment (chapter 7) completed by the Canadian Arctic Gas Pipeline Company:

ENVIRONMENTAL IMPACT OF THE PROJECT (Chapter 7 - Abbreviated Table of Contents)	
7.1	Terrain and Minerals
7.2	Water Resources
7.3	Air
7.4	Aesthetics
7.5	Vegetation
7.6	Fish
7.7	Birds
7.8	Mammals

**Table 1.** Elements of the environmental assessment undertaken by Canadian Arctic Gas Pipeline Company.

Each category is assessed as to the current status of the species or element according to quantity, location and special features. No mention is made of the cultural, social and economic value of these species to the people of Old Crow, or the inter-relationship between elements. Subsistence activities are not mentioned in the environmental impact assessment, despite the fact that the harvesting of many of the species mentioned is crucial to the survival of the people of Old Crow. Nor is the spiritual or mythological significance of various species of fish and wildlife even mentioned, despite the prominence of such species in the rich oral histories, stories and clan structure of Yukon Indian people.

Similarly, the approach to the socio-economic impact assessment of Old Crow is sadly lacking from a community perspective. The table of contents for the socio-economic impact assessment of the Arctic Gas Pipeline is too lengthy to summarize here. It suffices to state that a sectoral approach is again taken, examining each social and economic component of the community, item by item -- the labour force, income, infrastructure, crime, education, health, housing, recreation and so on.

A major section of the socio-economic impact assessment is entitled "The Subsidized State" (chapter 6, volume 2), in which the consultants present data to imply that Old Crow is so heavily subsidized by government funds, through welfare and other transfer payments, that the prospect of private industry wages flowing into the community from the pipeline would save the community from this perpetual state of dependence.

Nowhere in the socio-economic impact assessment studies are cumulative impacts discussed with respect to the necessary short- and long-term infrastructure requirements for the exploration, production and transportation of hydrocarbons from the Beaufort/Mackenzie Delta region (roads, corridors, ports, twinned pipelines, supply staging areas). Nor is the single most important question in the minds of the people of Old Crow discussed -- what are the short and long term impacts of increased industrialization on the people of Old Crow and on the land and wildlife resources of the northern Yukon?

These assessments were carried out quite some time ago (1974), and since that time the field of environmental impact assessment has evolved. The inventory or "grocery list" approach to impact assessment has come under considerable criticism. In 1981, however, participating companies in the Beaufort Environmental Assessment and Review were still using the inventory approach, without adequately addressing the crucial questions of values, goals and aspirations and the inter-relationship of all the elements under assessment in social, economic and cultural terms.

## **OLD CROW'S APPROACH TO IMPACT ASSESSMENT**

The regular planning workshops held weekly in to develop the Old Crow Community Plan were used as a forum for discussion of concerns with conventional impact assessment and ideas for a community based approach to impact assessment. Experience with previous impact assessments was used as a starting point to discuss the elements residents perceived as missing in conventional impact assessment, and therefore elements important to include in a community-based approach to impact assessment.

Various issues of impact assessment were discussed, including:

### *Purpose*

- What is the purpose of impact assessment?
- What are the objectives of all parties involved?

### *Process*

- How is impact assessment carried out? Is it community based or scientifically based? Is it carried out by consultants, company, government? Is consensus reached?

### *Data collection*

- What type of data should be collected?
- What indicators could be used in measuring this data?

### *Assumptions and values*

- What assumptions and values are attributed to the data?

### *Monitoring*

- How are impacts monitored?

The focus of discussions in the planning group revolved around the desire to measure future development options against their goals and objectives as a people and as a community, not against another culture's definition of development. The people of Old Crow are in the process of defining their goals, objectives and values through their Community Planning meetings, oral traditions, stories and legends, and from a closer examination of the range of sustainable economic development options open to them.

In addition, the residents of Old Crow felt it was important in impact assessment for all parties to define their objectives in the process. The objectives of industry, private enterprise or government (within their own region, as well as outside the region) may not be the same as the objectives of the community. Residents also pointed out that their definition of development and environment may differ from that of other parties in the assessment process, and that it is important that these definitions be clear from the start. Finally, there is the difficult question of how values are attributed to data and how judgments are made concerning impacts -- how impacts are measured, and who decides. Old Crow residents suggested changing the categories of data collected to reflect values and indicators reflective of traditional knowledge and customs important to their culture.

The following approach is suggested by the people of Old Crow as a general framework for community based impact assessment. This framework could be applied to projects being proposed from outside of the community, as well as to projects initiated from within Old Crow, such as tourism and forestry projects.

In order to provide examples of this approach to impact assessment, the Old Crow Community Planning Group has worked through several examples that link their stated goals and aspirations with the type of information necessary for community impact assessment. These examples are only for the purpose of this report and do not necessarily reflect the final goals and objectives of the Community Planning Project. In general, however, the goal statements are reflective of the intent of the people of Old Crow to link their traditional knowledge and customs with their future goals and aspirations as a community.

These following categories, listed in Table 2, are meant to supplement (or in some cases substitute for) the categories undertaken by conventional impact assessment, and for that reason cannot be interpreted as being comprehensive.

	Community	Proponent
Goals and aspirations		
Definition of Development and environment		
Values reflected in goals		
Assumptions reflected in goals		
Data to be collected for EIA and SIA: traditional and scientific		
Values and weighting attributed to data in order of importance to parties		

**Table 2.** Categories undertaken by conventional impact assessment.

### Traditional Knowledge, Values and Impact Assessment

The term traditional knowledge is used increasingly in reports, scholarly papers and conferences on renewable resource management and sustainable development. There has been an increasing acknowledgement worldwide of the value of traditional indigenous environmental knowledge and resource management systems. This is reflected not only in a vast and expanding professional literature, but also in recognition of the relevance of traditional knowledge and management systems by some governments and international science-based or development-oriented institutions (Andrews 1988).

Despite the growing body of literature and the growing awareness of its importance, surprisingly little of the information has actually been incorporated into the practical day-to-day administration and policies of governments responsible for impact assessment, resource management and allocation. Popular as traditional knowledge is among academics and scholars, there may be real constraints to actually applying such knowledge in our culture of decision making. Usher (1986) has argued that wildlife management scientists are themselves largely unaware of the ways that their own scientific enterprise often presupposes and incorporates

culturally specific ideas and values, such as the notions of property and individuality, which are assumed in our society and our political institutions.

Some optimistically predict that the co-management structures emerging from land claim settlements will bring about a slow but persistent melding of traditional and scientific knowledge into more effective systems of addressing northern resource management issues (Osherenko 1988). Others predict that co-management will, in the long term, come to constitute a form of co-optation and domination, which will weaken self management and self-government (Feit 1988). Usher (1986) has expressed the concern that these so-called improvements are more likely to add up to a system in which native harvesters merely provide data, and the state system continues to do the managing and allocation.

The community of Old Crow is involved in co-management of the Porcupine Caribou Herd through the Porcupine Caribou Management Board, comprised of representatives of user communities and government biologists. Through this forum, residents of Old Crow have experienced the different perceptions, values and objectives held by scientists and by native harvesters of the same common resource -- the Porcupine Caribou Herd. To date there has been enough common ground between parties to allow for successful cooperative management of this herd.

### Deriving Values and Indicators from Goals and Aspirations

There are undoubted difficulties of translating or using traditional knowledge in practical applications of impact assessment or other forms of resource management arises. Often, planners and resource managers ask the very practical question of how they are to reflect this "new" body of knowledge that has recently been acknowledged within their institutions. It is not enough to ask to them to take into account traditional knowledge. Predictably, what happens is virtually the same ethnocentric values and methods are applied to the conventional data and this "new" information is usually regarded by conventional planners and economists as difficult to quantify.

New values and assumptions must therefore be spelled out to assist those carrying out impact assessment to accommodate traditional cultures and their ways of viewing the land and its resources. It is the dominant culture that must adjust to ethnocentric ways and methods of calculating "progress." All too often, we read that traditional knowledge must be "integrated" into conventional scientific methods. The people of Old Crow say that scientific methods and conventional systems of resource management must learn to fit into their traditional ways of viewing and using the land, for these values form the basis of their future survival.

How then to translate practically what is meant by traditional knowledge? The residents of Old Crow suggested starting with their goals -- what is important to them as a people and a community -- then extracting "values" from these statements, and identifying events or activities that could be measured to act as indicators.

The following are example of goals and aspirations have been taken from the Old Crow Community Planning Project and the Yukon Indian Land Claim Framework Agreement.

*Culture*

- To strengthen the culture of the Vuntut Gwich'in through such measures as: increased documentation of oral histories and traditions; increased practice of traditional activities, celebrations, feasts; increased time learning from elders; and increased visits with friends and relatives in Alaska and the NWT.
- To recognize the cultural values associated with traditional communal sharing and survival and to translate these values into present day actions in managing and allocating resources.

VALUES REFLECTED	POSSIBLE INDICATORS
cultural strength, traditional; knowledge, customs, celebrations; elders, shared responsibility.	number of oral histories completed; number of traditional activities, feasts, celebrations; number of programs/ activities to learn from elders; number of visits and gatherings of Gwich'in peoples.
communal model of survival, sharing, strength of the family and community.	number of projects, activities, programs based on a communal model; number of families engaged in land based activities and business.

**Table 3.** Cultural values and possible indicators.

*Elders*

- To honour and show respect to the elders of the Vuntut Gwich'in through caring for elders,

involving them in community decisions, and offering opportunities to learn from their wisdom and experience.

VALUES REFLECTED	POSSIBLE INDICATORS
wisdom of elders; caring for elders.	number of community events for the elders; frequency of meetings of the Elders Council; number of elders involved in decision making and teaching living conditions of elders.

**Table 4.** Values and possible indicators for elders.

*Economy*

- That the activities of the subsistence economy be formally supported and respected by future development plans for the region.
- That industrial development in the region be encouraged only if it can provide for the long-term enhancement of the culture and renewable resource base of Old Crow.
- That proposed developments be discussed with the Vuntut Gwich'in.

VALUES REFLECTED	POSSIBLE INDICATORS
subsistence activities: hunting, fishing, trapping, berry picking, gathering of plants; informal economy: barter/exchange barter; long term viability of resource base; cooperative management of the resource base.	number of days spent hunting, fishing, trapping, berry picking, gathering plants, engaged in barter; amount of money spent supporting base the subsistence economy; number of people participating in informal economy activities; number of industrial development proposals that enhance renewable resource base and cultural opportunities for Old Crow residents.

**Table 5.** Economic values and possible indicators.

*Environment*

- To protect the renewable resources - land, water, forests, fish and wildlife - of the northern Yukon.
- To recognize the traditional wildlife harvesting and management customs of the Vuntut Gwich'in within scientific systems of resource management.
- To recognize the spiritual values that the land, water and creatures within hold for the Vuntut Gwich'in, and to respect the stories, mythologies and legends that flow from this spiritual relationship to the earth.

VALUES REFLECTED	POSSIBLE INDICATORS
intrinsic value of the land and its resources; traditional customs with respect to the land and resources; spirituality; conservation and frugal use of resources preservation for the future; living with the environment, not conquering it; respecting natural cycles communal responsibility and sharing of food, resources.	number of management and policies of Vuntut Gwich'in harvesting and management customs.

**Table 6.** Environmental values and possible indicators.

*Education and Training*

- That the language of the Vuntut Gwich'in be taught in schools and used whenever possible in the community at gatherings, celebrations, etc.
- That the history and traditions of the Vuntut Gwich'in be formally integrated into, the curriculum of Old Crow school materials.
- That adult education and training opportunities focus on skills relevant to renewable resource activities and future options in the Old Crow region, such as wildlife management, tourism, fisheries, forestry and related activities such as construction and boat building.
- That infrastructure and service opportunities be developed to support the above activities:

transportation and shipping of goods (air and river)  
 construction, tanning, handcraft production.

VALUES REFLECTED	POSSIBLE INDICATORS
cultural strength of language history and traditions of Vuntut Gwich'in; preference for long-term skills training; preference for renewable resource-based economy.	number of Kutchin speakers; number of grades in which these history and traditions are taught; number of training opportunities for Old Crow residents in renewable resource management, tourism etc.; number of support services.

**Table 7.** Educational/training values and possible indicators.

*Employment*

- That job development and employment opportunities stress long-term skill development for the region consistent with future development goals of Old Crow (development of the renewable resource base, tourism).
- That job opportunities and adequate northern benefits for employees strengthen family unity and community cohesiveness by avoiding long absences from community and family.
- That training and apprentice positions be properly structured into job positions within the community.
- That a hunter support and income security program be implemented for the community of Old Crow to stabilize subsistence activities and the benefits to the community.
- That other necessary training, such as like-skills and self-development be available, so community members are prepared for changes in their present lifestyle.

*Individual and Community Health and Well-Being*

- To maximize the health and well-being of the people of Old Crow.
- To provide support to and shared responsibility for those individuals and families experiencing conflict and difficulty in achieving a healthy family and community life.

- To strengthen communal ways of dealing with stress, conflict and discord within the community.
- To raise the standards of living for elders and those persons without adequate shelter, food and care.

VALUES REFLECTED	POSSIBLE INDICATORS
long term skill development; renewable resource jobs; learning opportunities; supporting subsistence activities.	number of new job initiatives in the renewable resource field increased support in dollars increase in subsistence activity by numbers of people.

**Table 8.** Employment Values and Possible Indicators.

VALUES REFLECTED	POSSIBLE INDICATORS
individual and community responsibility for well-being of community; communal models of caring good health and well-being; modest lifestyles.	health statistics of residents of numbers of residents without adequate shelter, food, etc.; numbers of community programs to assist those in need results of those programs.

**Table 9.** Values and Possible Indicators of Health and Well-Being.

**PROJECT-SPECIFIC IMPACT ASSESSMENT**

Old Crow wishes to see the following elements incorporated into project-specific impact assessments:

**The definition by the community of the problem /issue / project under assessment.** Old Crow residents felt that community people almost always have a different definition of what is to be assessed, what the problem is, and what their environment includes than do other parties to the assessment, particularly industry. Therefore, they wish to be involved in defining the problem or project to be assessed, the purpose of the assessment, and the scope of the assessment.

**A clear statement of the objectives of all parties involved in the impact assessment.** Old Crow residents felt that the objectives of all parties should be clearly articulated from the beginning of the process. Typically all parties involved in impact assessment have different objectives in carrying out the assessment -- the proponent is by definition promoting the project, government is

usually trying to balance interests, and communities and public groups are interested in protecting and enhancing their lifestyle, community goals and aspirations. These may or may not be in conflict with the objectives of the other parties.

**The assumptions made in impact assessment.**

Assumptions made with respect to impact assessment should be clearly set out at the beginning of the process, with all parties contributing to their clarification. Assumptions are based on value judgements that are highly subjective and tend to be very ethnocentric. For example, Old Crow does not assume that any project that provides jobs for Old Crow residents is necessarily beneficial to the long term goals of the community. It depends on the type of jobs and whether these jobs allow Old Crow residents to maintain their family and carry on with traditional activities. For example, during the building of the Alyeska Pipeline, many of the leaders and young people were encouraged to leave their communities in order to work on the pipeline, leaving their communities bereft of leadership.

**The definition of development.** Above all else, each party involved in the assessment should clearly set out a definition of what “development” means in their particular context. Old Crow’s definition of development is: Any action (project, program, event) which strengthens the cultural, social, economic and spiritual goals of the community of Old Crow.

**The question of need.** One major difference in perspective on impact assessment is often the question of “need”. Most impact assessments are carried out by project proponents (usually industry or government). The assumption is usually made that the project is needed. When communities such as Old Crow wish to present viable alternatives to the project in the course of the assessment, they often have no opportunity to do so.

**Definition of environment: What is included in an EIA and SIA?** Conventional EIA often includes only the natural environment and tends to be oriented strictly to ecosystems, or even species-specific management issues. SIA tends to focus exclusively on the social and economic aspects of the project. Indigenous people often find these divisions artificial, since there are many social and cultural aspects of the EIA that should be taken into consideration by those carrying out the assessment. This very seldom happens since the EIA and SIA are undertaken by different staff (biologists and physical scientists for the EIA, and social scientists for the SIA). This is precisely the problem that community people have in working with and understanding many conventional scientists. Cultural aspects of resource management are seldom a major focus, even though these factors are critical to communities such as Old Crow.



For example, in the Beaufort Sea Environmental Assessment and Review Process dealt with the impacts of development on species such as polar bears. Oil companies indicated that in the event that populations were depleted, Inuit people would be compensated for the loss of the value of the hunt. This approach misses entirely the cultural and social educational value of the hunt and the related customs associated with polar bears and their environment.

### **THE IMPORTANCE OF CONCEPTUAL LEVEL IMPACT ASSESSMENT**

First, the community of Old Crow wishes to be involved in the conceptual level of impact assessment; in determining the options for the development of the North Yukon region long before specific projects or proponents are identified. This is consistent with the principles negotiated in the Yukon Indian Land Claim Framework Agreement on Land Use Planning.

The Beaufort Sea Environmental Assessment and Review Process of 1980-83 was intended to be a conceptual level assessment of the options for hydrocarbon development. However, the interests of Old Crow were ignored with the exclusion from the process of exploration activities, such as the Gulf Canada proposal for a deep-waterport at Stokes Point. It made no sense to the people of Old Crow to exclude such an important development proposal, since their lives depend on the integrity of the calving grounds of the Porcupine Caribou Herd. These were potentially at risk from the development.

Involvement at the conceptual stage is the only way the Old Crow community will ever play an effective role in helping to determine the acceptable parameters for future development in the region. It is totally unacceptable to Yukon Indian people to be treated as an interest group long after the need for the project has been determined by interests outside of the region, the Yukon Territory or Canada. This necessitates the recognition, by government, industry and other third party interests in the northern Yukon, of the rights of the people of Old Crow to ownership and control over a portion of the land and resources in the North Yukon, along with the Inuvialuit of the Northwest Territories. It also necessitates the recognition by all parties that conceptual assessments must not exclude

relevant development activities, such as exploration, as well as discussions of major constitutional development issues, such as land claims.

Old Crow sees the purpose of conceptual assessments as a means of reviewing possible future development scenarios, problems or opportunities in the region, and focusing the scope of subsequent detailed projects, policies or programs. Such conceptual assessment could be implemented through the Federal Environmental Assessment and Review Process, the new Development Assessment Process for the Yukon, and under Section 15 of the Northern Inland Waters Act.

### **REFERENCES**

- Andrews, T. 1988. Selected bibliography of native resource management systems and native knowledge of the environment. In M.M.R. Freeman and L.N. Carbyn (eds.). *Traditional Knowledge and Renewable Resource Management*. Edmonton: Boreal Institute for Northern Studies, 105- 134.
- Berger, T. 1977. *Northern Frontier, Northern Homeland. The Report of the Mackenzie Valley Pipeline Inquiry. Volume One*. Toronto: James Lorimer and Co.
- Feit, H.A. 1988. Self-management and state-management: forms of knowing and managing northern wildlife. In M.M.R. Freeman and L.N. Carbyn (eds.). *Traditional Knowledge and Renewable Resource Management*. Edmonton: Boreal Institute for Northern Studies, 72-91.
- Gemini North Ltd. 1974. *Social and Economic Impact of Proposed Arctic Gas Pipeline in Northern Canada. Book 1*. Prepared for Canadian Arctic Gas Pipeline Ltd. Calgary.
- Osherenko, G. 1988. *Sharing Power with Native Users: Co-management Regimes for Arctic Wildlife*. Ottawa: Canadian Arctic Resources Committee, Policy Paper 5.
- Usher, P.J. 1986. Devolution of power in the Northwest Territories: implications for wildlife. In *Native People and Renewable Resource Management*. Edmonton: Alberta Society of Professional Biologists, 69-80.

## 5. EHATTESAHT TRADITIONAL FISHERIES SYSTEMS

**P.A. Berringer, W. Green and V. Smith**

This study has emerged from the coincidence of two sets of interests. The Ehattesaht and Nuchatlaht tribal governments are deeply involved in developing a comprehensive understanding of their traditional systems of government and resource use and management. From the Ehattesaht and Nuchatlaht perspective, understanding these systems is fundamentally important to the development of sustainable relationships between native and non-native communities and between humans and the natural world. The Canadian Environmental Assessment Research Council (CEARC) was interested in knowledge which can be used to improve environmental impact assessment processes. To this end, they have funded research to increase knowledge of traditional aboriginal systems of resource and environmental management.

The specific objectives of this study are:

- to document community knowledge of traditional fisheries and systems of management;
- to identify what could be learned through further research, including the identification of information sources and methods;
- to analyze the relevance of traditional approaches and their relationship to modern day systems of fisheries management; and
- to develop recommendations on an appropriate strategy to study the impact of non-native fisheries on valued species and the impact of development activities on the marine ecosystem.

It is important to point out that the comprehensive documentation of community knowledge of traditional fisheries and systems of management is an immense task which is beyond the scope of this project. In this regard, this project should be viewed as a preliminary study to identify and establish relationships with knowledgeable elders.

### STUDY METHODS AND AREA

This report is based on research performed between December, 1988 and June, 1989 with members of the Ehattesaht and Nuchatlaht native communities on the west coast of Vancouver island. This area was selected for the research project for two reasons:

- The communities are small compared to many of the other Nuu-chah-nulth communities. This made it easier to contact and interview all of the elders concerned.
- The two tribes are actively working to develop a

fisheries management system based, in part, on their traditional systems.

The research team consisted of community researcher Victoria Smith (a member of the Ehattesaht Tribe), fisheries biologist William Green, anthropologist Pat Berringer, and elder advisor Moses Smith (also an Ehattesaht Tribe member). Videotaped interviews were held with elders and other knowledgeable people from the Ehattesaht, Nuchatlaht, Kyoquot and Ahousaht tribes. Further information was obtained from ethnographic, archaeological, historical and archival sources, published and unpublished. Several members of the community read early versions of the draft report and provided comments. In addition, the draft report was presented for discussion at community workshops held in June at Zeballos. The workshop provided valuable feedback which is reflected in this final report.

The Ehattesaht Tribe is a member nation of the Nuu-chah-nulth Tribal Council, which represents fourteen tribes on the west coast of Vancouver Island. The present day Ehattesaht Tribe consists of families from the historic Ehattesaht Confederacy. The confederacy consisted of approximately 18 autonomous, but interdependent tribes and clans. All of these tribes and clans had village sites from Rugged Point south to Tahsis Narrows at the eastern extremity of Esperanza Inlet. This inlet lies at the north end of Nootka Island.

The present day villages are Chenakint (Queen's Cove) and Ehatis (Zeballos). There are 154 tribal members and a total of nine reservations. The Ehattesaht Tribe is intimately affiliated with the Nuchatlaht Tribe. The traditional territory of this tribe is in the same general areas as the Ehattesaht traditional territory, as well as further south. There is much intermarriage between the two tribes.

The tribe is presently governed by the elected council system, and administered from an office in Campbell River. Efforts are being made to revert to the hereditary chief system. Part of this effort is reflected in the resettlement of the community of Ehatis. The homes are situated in order of importance according to the traditional practice.

### COMMUNITY KNOWLEDGE OF TRADITIONAL FISHERIES SYSTEMS

This section describes the key points which emerged from the elder interview program. It contains extensive quotations, as well as the observations of the community researcher. It is

important to emphasize that the subject matter is extremely complex; it goes to the very heart of traditional Nuu-chah-nulth culture and society. Only brief summary is given of the wealth of information contained in the videotapes of the elder interviews; and in turn, the elders were only able to share a small fraction of their knowledge of these subjects in the relatively brief research period.

The following subsections dealing with different aspects of the traditional fisheries systems. The traditional fisheries systems of the Nuu-chah-nulth people cannot be divided into 'fisheries' systems and 'management' systems -- harvesting, utilization and management were part of the same system and were totally integrated into all aspects of their culture. The traditional fisheries system of the Ehattesah tribe has to be understood from its own, holistic perspective, and not from the fragmented, specific orientation of present day management systems. The traditional fisheries system is based in a system which integrated spiritual beliefs and a world view, a system of resource ownership and access, a socio-cultural system, and a political system. Modern management systems are based on a distinct separation of harvesting, utilization and management, and are not considered part of a larger cultural system. This is one extremely important lesson to be learned from traditional management systems - that management functions within a larger cultural context.

### Spirituality and World View

The Ehattesah spiritual philosophies, principles, teachings and practices form the foundation of the traditional fisheries system. The foundation of the philosophy is that breaking the 'laws of nature' is condemning something to extinction in the 'chain of life.'

All things are gifts from the Creator of 'Nahs' - the body, the mind and its senses, the air, land, water and all other things.

Grandparents begin the teachings by talking to the child beginning four days after birth. The teachings continued all through the life of the individual.

The gifts from the Creator were given absolute reverence, ceremonially and in daily living. According to one Nuu-chah-nulth elder, it was customary to discipline oneself by means of fasting and prayer on a regular basis and in tune with the cycle of the moon.

Salmon were highly revered by the Ehattesah, as demonstrated by the 'first salmon ceremony'. The purpose of this ceremony is to give thanks to the Creator for the return of the salmon and to pay respect to the salmon.

"If we don't respect them they know, they got the feeling." Out of discipline and respect for the salmon, "the bones and guts go to the water, not to the woods."

In relationship to the land, one elder said that, "They never claimed the land -- the land claimed them. If they agreed with the land then they would be able to live there."

### 'Ha-houlthe' - Rights and Responsibilities of a Hereditary Chief

Ha-houlthe literally means the "rights of the chieftainship." "Nuu-chah-nulth traditions demand that our hereditary chiefs hold the responsibility for the dispersion and maintenance of the forests, the land and the sea that sustained the resources that live within them." The hereditary chief's territorial rights encompasses the total area within his tribal limits. A hereditary chief has absolute sovereignty within his territorial ha-houlthe; therefore, he or she may act independently of other hereditary chiefs.

Although a chief had absolute sovereignty, he or she did not have a dictatorship, nor live in isolation of other villages. The actions of a chief were governed by strict laws, protocol and respect. "Respect your people and they will respect you."

There are two distinct categories of ha-houlthe -- tangible and intangible. The tangible may be further subdivided into specific and common ha-houlthe.

Tangible ha-houlthe is territorial: mountains, valleys, watersheds, river estuaries, beaches, reefs and offshore waters. All of these provide the essentials for daily living. The tangible aquatic resources may be specific or common. The specific ha-houlthe includes all species of salmon. The common items include clams, sea urchins, chitons, reef fish, abalone, halibut banks and other non-anadromous species.

The intangible ha-houlthe of a chief includes ritual songs, dances, access to names of longhouses, family names, certain seats in the longhouse at a potlatch, specific cuts of a whale or hair seal or use of certain masks. These are the most common. During the course of the interview program, each elder spoke of different types of ha-houlthe; it is impossible, at this time, to provide an exhaustive list of examples. The intangible ha-houlthe rights are unique to each tribal grouping or chief.

The following is an example of the transfer of tangible ha-houlthe. A head chief of 27 chiefs did not own any rivers. Therefore, he proposed marriage into a high ranking family that owned a river well known for its runs of chum and tye (chinook) salmon. The owner of the river consented to the marriage. Once married into the family, the head chief acquired the rights to fish the river except for three very specific places:

- the mouth of the river, where the fresh and salt water meet;
- a large deep pool three miles up the river, for gaffing of salmon; and
- a small tye creek with a lake behind it, where the watersheds meet.

The head chiefs were also not permitted to harvest berries along the banks of the river. This demonstrates that the head chief did not gain ownership by marriage; only access to fish.

### Resource Utilization

It is evident that the community members recall traditional philosophies, teachings and practices very well. It is also realized that it would not be practical to use all of the 'old' ways of fishing and harvesting now. On the other hand, barbecuing salmon over an open fire is still done in the same fashion as it was generations ago. "It is just the best way to barbecue salmon."

Dog (chum) salmon are still prepared in much the same way that they were many years ago. For practical reasons and out of respect, the whole salmon continues to be used. When curing dog salmon for the winter, the main body is sliced thinly, the backbone and tail are barbecued briefly over an alder wood fire and then put into a smokehouse until absolutely dry. The same happens to the head and skin.

Mussels and clams were never harvested during the herring spawn season, due to the milkiness of the water. They were harvested during the winter. Harvesting ceased when the geese began coming north for the summer.

Traditional attitudes of respect for the gifts of the Creator are still valid and practised today. People in the communities visited told of their concerns about clam beaches, rivers, reefs, mountainsides and all other natural resources within their ha-houlthe.

### Resource Protection, Conservation and Regulation

"On the west coast of Vancouver Island most of the tribes have villages at the mouths of rivers, tops of inlets or close to the open ocean." These locations were (and are) best suited to regulate and protect the ha-houlthe.

Ehattesaht villages are strategically situated in and around the Esperanza Inlet. All the villages are located in close proximity to the resources within a chief's territory. For example, the family which the head chief of 27 chiefs married into resided at the mouth of the river they owned.

Every hereditary chief group had individuals from their family or tribe called 'whet-wock.' A whet-wock is a person trained from childhood to know, intimately, their hereditary chiefs ha-houlthe, tangible and intangible. This person was also schooled in the natural cycles within the ha-houlthe boundaries. His role is comparable to a police or fisheries officer. He had the authority to forbid or permit harvesting.

In Nuu-chah-nulth tribes, there was (and is) also a personification of ultimate authority - the head wolf. He

virtually had the authority to veto decisions made by the whet-wock or the head chief.

One Nuchatlaht chief had a river as part of his ha-houlthe. This sockeye and chum salmon river was fished using a system of weirs. The first weir was approximately five feet long and three feet wide, and constructed of cedar saplings and spruce roots, with the opening facing down stream. The second weir was larger, approximately 15 feet by three feet. It was designed to catch fish not caught by the first weir.

During the years when runs were determined to be good, it was customary for the chief to fish for himself and his family, and then to open it up to the members of his tribe. Meanwhile, someone was always watching and testing the salmon to find out if it was ready to spawn. "They knew it was ready when the eggs were loose."

When the fish began to ascend the river, "the chief caught what was needed and what he needed to give away, and then it was opened, the trap". "He never tried to fish it out. They would leave some for seed stock..." As it was the chief's responsibility to disperse and maintain the ha-houlthe and disperse its production, the harvest would be shared by all.

Ha-houlthe rights were closely adhered to as a matter of spiritual discipline and respect for the land which claimed the people. The 'institution' which helped maintain knowledge of territorial boundaries, orally, was the potlatch. At a potlatch, the speakers for a chief would recite (for example) the specific history of how a chieftainship was attained and how a particular person was entitled to his or her ha-houlthe.

The teaching of 'conservation' began at a young age. The grandparents began to talk to a baby four days after birth. They were taught how to 'watch nature.' Also, the grandparents would tell the children stories. One elder remembers falling asleep while being told a story and being woken up because he was going to be told another story. After a story was told four times, a grandparent would say something like this: "Okay, you tell me the story and I will correct you." This was one method of teaching conservation attitudes and behaviour.

The conservation attitudes and methods stem from the spiritual foundation described earlier: "Everything is a gift from the Creator..."

One elder remembers: "There used to be thousands upon thousands, just acres of dorsal fins waiting to get up the river. The bay would be just alive with jumpers. Great big stuff (fish)." This is in reference to the Little Zeballos River. He remembers a time when the salmon spawn was so bountiful that a seagull couldn't fly due to eating too much roe. He recalled having to kick the seagulls out of the way just to walk along the bank of the river. "It was never a problem when fish spawn too much because the bears and eagles and other

animals would just eat well. Nature took care of itself.”

During the years when runs were determine to be poor by the chief, the heads of the households would gather to discuss the situation and decide whether to fish a little bit or not at all. One method of run size determination involved counting the number of spawners within a number of ten-pace-long stream sections.

In the years when the fall salmon runs were poor, people noted that it was customary for families to move into other areas with different food sources. For example, people might move to their summer sites and live off game and shellfish. The families remained within their own territories; boundaries were absolutely respected.

### Sharing and Caring

Although a ha-houlthe belongs to a particular chief, he has the right to share it. This is usually done within families.

Family roots, or ‘moalth-moos’, are of utmost importance to Nuu-chah-nulth people. Each family unit would have their own historians. These historians would know exactly who the chief was related to and why.

The Ehattlesaht and Nuchatlaht people are two distinct tribal groups. There is much intermarriage between the two tribes. For this reason, the Ehattlesaht are openly permitted to harvest herring spawn in Nuchatlaht territory.

Generally, families would decide within their territories for the term of their life. This helped individuals develop the local knowledge about how best to care for and manage the natural resources within the ha-houlthe.

Queen’s Cove John was raised in Queen’s Cove. His family taught him how to tend all of the species and salmon rivers. Descendants of Queen’s Cove John can remember him preparing the river so the “salmon would not have to do it alone.” He would remove any log jams and beaver dams, ensure that the gravel beds were clean and make sure there was enough shade.

Practising sharing still occurs extensively with the Nuu-chah-nulth commercial fishing fleet. Most fishermen provide fish on a regular basis for the people without boats in their communities. Some of the principles and practises have survived the residential school system. Also, some young tribal members have elected to become versed in modern fisheries management through college and university programs, in addition to being educated in the traditional philosophies and policies.

## RELEVANCE AND RELATIONSHIP OF TRADITIONAL APPROACHES TO MODERN DAY SYSTEMS OF FISHERIES MANAGEMENT

### Preliminary Analysis of Traditional and Contemporary Fisheries

There is a striking contrast in cultural attitudes towards exploiting marine resources between the traditional native approaches and modern fisheries management systems. The native fishery system was based on a spiritual kinship with the animal which the people depended on. Food and wealth goods produced through the practices of native marine resource utilization were not considered “commodities” in the present sense of the word. Nor is it accurate when referring to Nuu-chah-nulth culture to emphasize the subsistence aspect of marine resources. The term ‘subsistence’ should be reserved for less complex native economies than the Ehattlesaht and Nuchatlaht.

On the west coast, food production was highly developed. There were efficient food storage methods and an extensive network of trading relations with other groups. The fishery was fully integrated with community needs and the system of values.

In fact, marine resource utilization was the foundation of the traditional Ehattlesaht economy. Through the social and political network of relations which operated throughout the area, storage foods were converted into wealth and prestige. Storage food supplies and trade goods provided the security on which each lineage group depended.

Since the introduction of federal fishery regulations in British Columbia one hundred years ago, the state has assumed most of the responsibilities for resource management previously exercised by the native society as part of its sovereign rights. Under the present system, the commercial fishery converts marine animals (resources) into a commodity to meet the needs of a market economy. Government agencies control fishery production, limit access to marine resources, and generally ensure that commercial fish processors maintain their markets. The system benefits individuals rather than local communities.

The federal agency responsible for west coast fisheries (Department of Fisheries and Oceans) has over the years established a complex regulatory system, which attempts to resolve conflicting demands on the resource from various interests. Through this agency the government issues licenses to commercial fishermen (trollers, seiners, and gill netters), encourages a sports fishery, and regulates the native “food fisher”. These parties compete with each other for what is

referred to as a “common resource”. Whether or not the fishery is a common resource is arguable and open to interpretation.

In policy statements issued by the British Columbia regional district office, the Department of Fisheries and Oceans has recently declared that the conservation of Pacific salmon resources has top priority in terms of policy implementation, followed, secondly, by its obligations to the native “food fishery”. These historic obligations originated in commitments made to the aboriginal people of British Columbia, beginning as early as 1852, of continued access to the salmon fisheries. According to this stated order of precedence, other demands on salmon fisheries fall in behind.

In practice, the policy has not been a success. Political pressures from the commercial fishing industry (corporate interests in the processing industry, fishermen and fishermen’s associations), sports fishing associations and the tourist industry are exerted on both federal and provincial authorities. Further, native fisheries rate a low priority with the provincial government in British Columbia, which favours developing the sports fishery for tourism.

While the objectives of the present study do not directly address the issue of how the obligations to contemporary native people are being met, it must be noted that the concerns of the Ehattesah and Nuchatlaht are not being adequately addressed. They are in a constant fight against the detrimental effects of environmental damage. They warn we must try to find solutions to avoid future damage to salmon streams, coastal beach foods, and the inshore maritime fisheries. What we as researchers have learned is that at a time when the bands and their tribal council are prepared to assume a key role in local resource decisions, they find themselves in a struggle to maintain their historic place in the west coast fishery.

### **The Ehattesah and Nuchatlaht Ecological View - Balance of Nature**

Nuu-chah-nulth peoples have a long history on the west coast of Vancouver Island. Human occupation is estimated, on the basis on archaeological research in Nootka Sound, to be 4,400 years old. Evidence of marine resource exploitation dates from the early period coastal occupation. Site surveys of the Esperanza Inlet area in 1984 located shell middens, stone tidal traps, fish processing sites, and many other indications of a long term dependency on marine resources by the ancestors of the present Ehattesah and Nuchatlaht.

Native knowledge is centred on respect for nature, an ecological awareness that has existed for generations on the coast. Traditional teachings emphasize the inter-relatedness of all things. physical and, in the Ehattesah and Nuchatlaht system of beliefs, non-physical. This world view implicitly recognizes the tenuous balance in nature. It supports the notion that humans must be careful to protect and sustain a proper

balance.

Our informants told us that people were taught to regard non-resident species -- salmon, whales, and herring-- as gifts whose reappearance each year should be received with thankfulness, not taken for granted. Stories associated with many resident species of fish and invertebrates tell how they originally came to these shores and of their adventures. The respect for salmon, celebrated in the First Salmon Ceremony at the beginning of each new season, was an illustration of this ecological awareness. If the earliest caught salmon were not properly handled, the trust or mutual respect which must exist between man (culture) and fish (nature) would be jeopardized. The gift must be acknowledged. The spirit of the fish must be appeased the bones treated with ceremony, the correct formula repeated, and a message sent back to the Salmon People that in this land lived people who could be trusted.

### **Access: Defining Traditional Right**

The ownership of resource locations, and plant foods was part of a system know locally as the Ha-houlthe. The ha-houlthe comprised a set of obligations and privileges to own or use valuable or named property. The term is also used to describe the area within which a chief exercised his rights. Examples of marine resource locations include:

- beach rights - clam beaches, mussel grounds;
- marine rights - halibut banks, herring coves;
- riverine rights - salmon streams.

The ha-houlthe consists of specific named sites as well as more general resource use areas. A chief usually held the right to the best fishing sites of major salmon producing stream. The title to a named location in some cases was expressed in very specific terms; for example, the right to set a cylindrical salmon trap at the most favourable place in a productive salmon stream, or the right to spear chinook in a certain pool or eddy. Marine resources were among the most valued property rights in Nuuchahnulth society.

It seems clear that each use right or property right was named, and referred to a very specific right of access. An example given by an elder illustrates this. On the marriage of her daughter to the chief of a neighbouring village, a Kyuquot woman bestowed most of her rights to an important salmon stream upon her new son-in-law. The woman kept three named privileges, three specified rights of resource use in the river: 1) a chinook fishery on small tributary, 2) a fishery in the estuary, and 3) a gaffing pool for chum salmon. Each resource opportunity was viewed as discrete event; each had a measurable value.

Similarly, the rights to other productive resource areas belonged to individuals on behalf of the lineage group. People with no rights to use a resource area were excluded. The history of each name location explained how the present

holder was entitled to the names he or she held. The names of those who previously held the rights to resource property, and the present incumbent's relationship to those people were announced at the time title was granted. All such declarations were made public at the winter ceremonials.

The transmission of titles to name tangible and intangible properties or rights is part of a complex legal-social system in Nuu-chah-nulth societies. Many features of the 'potlatch' system are well documented in the anthropological literature. For example, the legal significance of publicly acknowledged transfer of privileges (names) to a new holder, and the responsibility of community members to witness and validate the transfer. Witnesses were given gifts in recognition of service.

Other aspects of the transfer of privileges remain part of Ehattesaht community knowledge. Why it is not better known outside the community has become clear from our preliminary study. Each chief had sovereign rights, each lineage established its own set of procedures for how to accomplish various things; for example, a transfer of titles or a means of establishing regulatory measures for the seasonal harvest of marine and riverine resources. As one elder told us, "every river had its own policy." An unique set of social relations and obligations made up each chief's ha-houlthe.

As stated above, high status chiefs generally held rights to the most important salmon streams, halibut banks, and productive resource areas. Control of major resources provided an advantage to high ranking families, enabling them to demonstrate the honour and prestige of their lineage in gift-giving ceremonies, or by arranging alliances with neighbouring tribes. A network of social relations existed throughout the territory of the Ehattesaht Confederacy based on alliances of marriage, trade, and other strategic relations. Efficient systems of resource utilization provided the necessary supplies of stored salmon and other goods needed to meet extensive social and political obligations.

## Resource Utilization

The traditional native economy represents an example of a viable system of resource utilization and social responsibility. Ehattesaht and Nuchatlait people are knowledgeable about the local resource base and their expertise has specific reference to location, species and community needs. The same facts about the fishery which inform contemporary management practices were previously the concerns of native resource owners who lived in close proximity to the marine resources they managed. Features in common are: capacity of resource base, seasonal harvesting, time required and average yields.

In the traditional fishery, user groups travelled as required in order to be in the right place at the right time for the peak

harvest. Each family knew what resources were available within its ha-houlthe and, based on experience, how much work was required to produce the winter storage foods. According to our preliminary information, the process of Ehattesaht fisheries and marine resource utilization exhibits these features:

- sustained use of resource base over very long time period;
- integration of social values, including a social order based on security for community members through food gifts and exchange;
- a rational management system (planning, execution, results);
- effective use of available labour; and
- reinforcement of cultural values including respect for nature, and relationship with the Creator ("Gift-Giver").

With specific reference to Pacific salmon resource utilization, the following features are present:

- [conservation] salmon runs managed individually;
- [data] monitoring runs on basis of familiarity with specific salmon stocks;
- [utilization] local groups organized fishing activities under the guidance of knowledgeable elders and leaders, both men and women providing expertise;
- [control] access was controlled by recognized principles of the ha-houlthe system of fisheries management; and
- [beneficiaries] the entire community, that is, the members of the lineage group, shared in proceeds of the catch.

Advantages of a detailed knowledge of an area and its resources are obvious. A degree of flexibility in monitoring and planning resource use activities is possible when control generates from knowledgeable persons on the site. One may argue that marine resources are enhanced by local control over resource management decisions.

In an economic environment where people depend on anadromous fish stocks to provide the staple food supply, the ha-houlthe system offers flexibility and control in planning the season's activities. If salmon runs were poor, people directed more of their food-gathering activities to other marine resources. Those who had rights to productive clam beaches and mussel grounds spent more time harvesting those areas. Chiefs with access to halibut banks traded dried halibut products to obtain salmon supplies, if necessary. Other strategies were employed during periods of acute salmon shortages. Families divided into small units and remained in areas where they could obtain shellfish, sea resources, and plant foods. Ha-houlthe rights and the boundaries of neighbouring tribes were respected (and if necessary enforced) during times of crisis.

## Resource Management and Conservation

A basic premise of the Ehattesah respect for nature is conservationist. It depends on people taking “only what they need”. This is the phrase Ehattesah people use repeatedly to describe their ancestors’ attitude towards conservation. The definition of what is needed includes winter storage foods, fresh food in season, storage foods for gift exchanges to meet reciprocal set of obligations, and storage foods for trade with other tribes.

Winter storage foods comprised large quantities of preserved fish and seafood. People knew how to process a range of marine resources obtained from the rivers and the sea, preparing the foods for long-term storage. Smoke dried salmon was the staple storage food. Various methods of butchering and preserving salmon are reported. As well, the Ehattesah processed smoked or sun-dried halibut, smoked cod, herring, herring roe on kelp, fish and sea mammal oils, mussels, oysters, chitons and clams, and dozens of other species, including such marine mammals as seals, sea lions and whales. Nuu-chah-nulth people were famous as active sea mammal hunters. Fresh foods taken in season included herring, halibut, cod, sea mammals, several species of marine invertebrates, and chinook salmon caught during the spring herring runs in bays and inlets.

In addition to the trade in food products with neighbouring groups, storage foods and other articles were traded with various tribes along the coast. Such trade was politically as well as economically motivated. Today, trade relations with distant tribes is less common. However, the obligation to exchange food gifts with neighbouring groups and to provide for members of the extended family is a marked feature of contemporary Nuu-chah-nulth.

Another aspect of native conservationist concerns is expressed in Ehattesah rituals and cultural beliefs which seek to appease the spirit of the animal. Fear of resource failure persists in oral traditions on the West Coast, despite the relative abundance of the area. It was necessary for humans to create an appropriate spiritual place for the salmon to occupy during the spawning cycle. Practical assistance included clearing the streams. Everyone took care of their own resource areas: spawning beds were protected, streams were maintained, and beaver dams, fallen trees and obstructions were cleared away. Ritual behaviour was equally important. After the First Salmon Ceremony was observed, people were free to “take what they needed,” and then to allow the fish to proceed. One informant said he never heard anyone in the old days say there was a problem with too many salmon going upstream to spawn. If escapement was heavy, there were other users -- eagles, ravens, bears -- who benefited.

Conservation was practised at the fishery site. The number of salmon taken during a run would depend on a combination

of factors, including the available labour to process the catch. Typically, women and young family members performed this work under the leadership of experienced women elders. Fishermen using spears (toggle-head salmon harpoons) and gaffs would fish until those processing the catch had enough salmon on hand. From time to time, the big cylindrical river traps or weirs were opened to let the salmon proceed upstream. When the smokehouses were filled with fish drying on the racks, the traps were removed from the rivers.

With the exception of small-scale trolling fishery, salmon stocks were typically exploited as individual runs in estuarine and river fishery locations -- where it is possible to identify local stocks. The emphasis on ‘managing’ individual stocks included preparing the spawning streams, evaluating the size of runs, taking more males than females, and reducing fishing activity when the return of salmon was below normal. Further research may provide additional information about the management of salmon stocks.

Resource variability, particularly occasional periods of food scarcity, presented special problems. An elder told us that if the salmon runs in a chief’s ha-houlthe were low, he would instruct his people to take only enough for their winter storage requirements; the chief then took his own share, but nothing extra for feasts and ceremonials, nor for normal purposes of trade. In a bad year, no winter ceremonials, were held.

The introduction of government fishery regulations began formally in 1888, initially with varying degrees of impact on local resource utilization. People in the Ehattesah territory continued for some time to use traps, gaffs and harpoons until gear restrictions were eventually enforced in the area. Cylindrical salmon traps, the most productive technology used in the swift-flowing streams of the west coast, were disallowed by the fisheries department. A considerable body of misinformation was circulated in the non-native community in the late nineteenth century concerning river salmon traps and weirs. The claim that traps and weirs were detrimental to salmon runs was not substantiated by any objective test. It was an illogical conclusion considering that healthy stocks of salmon annually occupied streams where Ehattesah people and their predecessors had used traps for many generations.

The Ehattesah, Nuchatlait, Mowachah and Muchalait all told us how big the salmon runs used to be in their tribal territories. Recent stock depletions of chinook salmon and other species greatly concern native people. Our informants said that factors which contribute to poor salmon runs are damage to spawning streams through the effects of logging, mining, spraying, industrial development (pulp and paper mills), and general neglect of stream maintenance by fisheries officials. “No one takes care of them now,” they said of the salmon streams. The elders also cited over-harvesting in the commercial and sports fishery as a contributing cause of salmon stock depletion.



During our workshop sessions, the elders and community members expressed deep concerns about the recent increase in over-harvesting local shellfish and invertebrate stocks -- clams, oysters, the sea cucumber, abalone and other 'exotic' species. They are witnessing with alarm the activities of non-local people who set up intensive operations on the beaches and shoals of Esperanza Inlet and adjoining waters, stripping the resources, leaving little or nothing behind for seed stock. They believe that in future more emphasis must be directed to ensuring that decisions affecting marine resources in this area benefit from local knowledge. They want input into decisions which effect the marine and riverine resources in the Ehattesaht area.

In summary, the lesson we learned from the elders is that our contemporary social attitudes towards the natural resources upon which we depend must be re-examined. Traditional attitudes serve to remind us that by satisfying immediate needs we deny the relation between man and nature and jeopardize the future of marine resources.

### **Social responsibility**

The historical approach of Ehattesaht and Nuchatlaht to the fishery is based on a set of values which honours cooperation and mutual support over competition and individual enterprise. Resources belong to the people, as people belong to the land. It is a holistic world view in which people, fish, god, earth, water are all related. This cultural value is commonly expressed within the community by a sharing of food resources, especially salmon and other marine products. Major social events and celebrations are characterized by sharing food and comfort. The formal oratory once heard in the great longhouses of the west coast are now rather more concise; nevertheless, supporting principles of social communication, mutual support, and food sharing persist.

The Ehattesaht people have a strong sense of place. The villages, coves, mountains and streams of the Esperanza area are part of their inheritance. It means more to them than cultural artifacts, like houses, boats, trucks, and roads. The history of their families is associated with the land and the sea. Their homeland includes all the aspects of nature associated with how the family has been sustained over long periods of time; how they have taken care of themselves in this place for many generations. This awareness among the Ehattesaht is inevitably associated with the resources of the sea, the rivers, and the land. Even those who are not fluent in the native language know the proper Ehattesaht names for everything from herring spawn to sea urchins. It is evident, whenever people are asked, that fish and other marine foods occupy a prominent place in the collective awareness, and that ideas about traditional resources are associated with a strong sense of community.

Ha-houlthe rights carried a sovereign responsibility to care

for the members of the lineage group, to share food resources, and to ensure the tribe's well-being. The tribal territory at Esperanza Inlet and adjacent areas is a comparatively remote area north of Nootka Sound. Specialists in the community retain the knowledge of family histories, names, titles, and rights to inherited properties. The history of the ha-houlthe is passed on to selected young people in each new generation. General information about traditional practices is part of the heritage in which younger members of the community are expressing a new pride.

Native tradition effects the lives of contemporary people in an every day sense. One way is by teaching the basic Nuu-chah-nulth cultural values of 'sharing' and 'caring'. From childhood, members of the community are taught to share with one another rather than to compete; it is a value strongly held in modern native communities. The transmission of cultural values in Nuu-chah-nulth society is associated with underlying attitudes of respect for nature and for the teachings of the elders: awareness of the cyclic nature of fish resources and other phenomena, considered as a 'gift of the Maker.'

### **Summary**

Our preliminary data suggests that the traditional ha-houlthe system was an efficient approach to the management of resources which met the needs of each tribal community. Further, it permitted sustainable resource utilization of local marine resources for over long periods.

The Ehattesaht developed a system of total resource utilization based on the following features:

- knowledge of the animals used as food resources-- life cycles, seasonal variations, etc. (resource ecology);
- sensitivity to environment;
- respect for balance of nature;
- socially responsible system of controlled access to resources;
- resource use opportunities broken down into discrete manageable units (intensive resource use); and
- continuity through time (commitment).

The Ehattesaht continue to have a long-term commitment to the area's marine resources, and to the land and waters which support them. Like other native people on the west coast, they have been practising "sustainable growth" for generations. In recent years, their control over resource utilization has from time to time been impeded by the enforcement of fishery restrictions. In the future, they want once again to take an active role in the management of local fishery resources.

In the traditional native view, nature and man are part of the same life principle; indeed they are part of the same process.

By contrast, the contemporary (“development”) view tends to see man and nature as opposing forces. As we enter the next century, the developmental model comes into conflict with a better understanding of the economy of our planet, and an increased awareness of the delicate balance of nature, the inter-dependency of all living things. As we continue to develop new responses to economic and environmental problems, we come full circle to a position that is closer to the traditional native perspective, in which we are part of nature, not apart from nature.

#### IMPACT ASSESSMENT RECOMMENDATIONS

The clear implication of the holistic, ecosystem-oriented approach to fisheries resource management is that the impacts of non-native fisheries and of development activities should not be considered separately. Therefore, the fourth objective of the study should be rephrased: to develop recommendations on an appropriate strategy to study the impacts of non-native fisheries and development activities on the marine ecosystem and valued species.

A holistic, ecosystem-oriented approach also implies that any impact assessment strategy cannot focus on the impacts of one development activity or one particular species. An impact assessment strategy also must be holistic, and firstly address the impacts of all development activities (existing and proposed) and any fisheries on freshwater, estuarine and marine ecosystems. Impacts on specific stocks of fish or shellfish can then be assessed in the context of ecosystem changes.

An example may illustrate the need for an ecosystem approach. The Somass River system in Port Albemi was an important chum salmon producing system until the late 1950s. Over harvesting of Somass River and other Barkley Sound chum salmon stocks then occurred, resulting in stock depletion. Despite the total cessation of chum harvesting, the Somass River chum salmon stock has not rebuilt. There are a number of possible reasons for this:

1. Extensive logging in the Somass River watershed has resulted in increased peak flows and sediment deposition in the lower Somass River, where chum salmon spawn.
2. Extensive agricultural and urban development in the watershed has resulted in the degradation of water quality.
3. The discharge of untreated kraft pulp mill effluent until the 1970's (and partially treated effluent since) has severely impaired estuarine water quality, to the point where waters below four meters in depth have insufficient oxygen to sustain juvenile salmonids. As a result, there is very limited estuarine smolt rearing habitat in the upper Albemi Inlet.

4. The enhancement of Somass River sockeye, chinook, coho and steelhead stocks has resulted in the utilization of the estuary and upper Albemi Inlet by very large numbers of salmonoid fry for rearing during the smolt emigration period (April to June). This results in both competition for food with chum smolt and predation on chum smolt by the much larger and faster smolt of these other species.

The point of the above example is that the stock was originally depleted by over harvesting (possibly exacerbated by low stock productivity), but that it has failed to rebuild as a result of all or some combination of the above four ecosystem changes. This raises the question of whether existing predictive impact assessment methods would have forecasted the continuing failure of the Somass River chum salmon stock. Alternative, holistic impact assessment procedures are needed, which will account for the cumulative impacts of all development and harvesting activities, and for ecosystem interactions (e.g., interspecific competition and predation, hydrologic impacts of forest cover removal, etc.).

A second implication of traditional fisheries management approaches is that a deep understanding of history is important to plan for, and predict, the future. The impacts of development activities and fish harvesting on an ecosystem cannot be predicted on the basis of a single ‘snapshot’ of the ecosystem at a particular point in time. Ecosystems are both evolving and subject to long-term cyclical changes. For example, it is now thought that the returns of sockeye salmon to Barkley Sound are subject to a large variations over a 12 to 20 year cycle which appears to be correlated with changes in nearshore oceanographic conditions (salinity and temperature). The implications of this cyclical variation for optimal fisheries management strategies and for fisheries enhancement are only now beginning to be considered. There are probably many other cyclical changes in marine ecosystems and fish and shell fish stock abundances which we are not aware of. However, elders often comment in meetings that variations which we now consider extreme and unusual have been observed periodically in the past. It is extremely important to have this historical understanding of the past behaviour of ecosystems and fish stocks as a basis for understanding and predicting current and future changes.

A final point is that traditional management systems were based on detailed, site-specific knowledge of fish and shell fish stocks and their habitats. For example, the fish weir and trap systems described in the first part of this report provided the tribes with detailed and accurate knowledge of the timing of spawning migrations and numbers of spawners. For the most part, this kind of detailed and watershed-specific information is no longer available. Accordingly, it is hard to understand how impact assessment can work without, at a minimum, a thorough knowledge of current stock and ecosystem status. Impact assessment, at least with respect to

fisheries and marine systems on the west coast of Vancouver Island, is doomed to be of limited utility until a site- and stock-specific information system is rebuilt. In Washington State, a watershed-by-watershed or stock-by-stock management information system has been rebuilt as a result

of the implementation of the 'Boldt' decisions. This system is an example of the kind of information system which is needed as a base for both effective fisheries management and environmental impact assessment.

## 6. WHERE DO WE GO FROM HERE? THE FUTURE OF TRADITIONAL ECOLOGICAL KNOWLEDGE AND RESOURCE MANAGEMENT IN NATIVE COMMUNITIES

Evelyn Pinkerton

In many parts of the world, traditional fishermen and hunters, along with the management regimes and ecological knowledge they harbour, are being eliminated (Forman 1980; Williams and Hunn 1982; Blitz 1987; Cordell and Fitzpatrick 1987; Chernella 1987; Moorehead 1989; Cordell 1989). Pressure on traditional fishing and hunting communities, which have served subsistence needs and local markets for centuries, comes from several sources. Some pressures come from a country's need for foreign exchange, such that, for example, it allocates fish to commercial offshore fleets instead of to traditional small scale inshore fishermen (Johannes and MacFarlane 1984; Zann 1985; Fernando *et al* 1985). International pressures for access to specific resources may cause a country to sacrifice a local aboriginal fishery to other concerns (Sparck 1987). A country may not have a state agency and regulations powerful enough to protect local territories from predation by more powerful forces (Sakiyama 1984; Arnold and Campbell 1986), or conflicting jurisdictions may diminish management effectiveness (Short 1987). In other countries, the growth of centralized bureaucracy itself, sometimes combined with development policies which introduce a cash economy and heavy taxation, destroys local regimes (Sawyer 1988; Moorehead 1989). Finally, pressure comes from pollution caused by industrial development (Stephens 1987), which is often unregulated or underregulated, and from the sale of fishing rights to industrial developers or governments promoting such development (Befu 1980; Sakiyama 1984; Ishihara 1984; Short 1987). Thus, the loss of the traditional management regimes often entails the loss of the resources as well.

At the same time, the World Bank, other development agencies, and the science community are attempting to grapple with the problem of how to support local institutions which promote best use of the resources of these countries and also do not destroy their social and cultural fabric (Emmerson 1980; Ruddle and Akamichi 1984; Ruddle and Johannes 1985; National Research Council 1986; McCay and Acheson 1987; Freeman and Carbyn, 1988; Ostrom, Feeney and Picht 1988; Pinkerton 1989b; Cohen and Hanson 1989; Berkes 1989b; Cordell 1989; Berkes *et al* 1989). Institutional economists are documenting the viability and economic value of arrangements which allocate certain use and management rights to collectivities of resource users rather than individuals (Ostrom, Feeney and Picht 1988; Bromley 1989).

Much of this literature deals with community-based

institutions for "common property" resource management. "Common property" resources are the ones used especially by hunters and fishermen: forests, rangelands, water, and marine areas. There is a growing recognition that neither privatization nor state regulation of these resources necessarily protects them from over exploitation, despite Garrett Hardin's (1968) prescription that these two forms of tenure could prevent the "tragedy of the commons." Hardin correctly perceived that the nature and location of these resources made control of access to them difficult (Taylor 1987; Berkes *et al* 1989). However, Hardin failed to distinguish both the problems of state and private control, and the difference between community control and absence of control. Often government is unable to control access, so that a state of "open access" or *res nullius* prevails (Ciriacy-Wanthrop and Bishop 1975). State ownership or *res publica* may not prevent the tragedy of the commons either: in Nepal, residents in outlying regions harvested forests with less restraint once these were defined as state property (Arnold and Campbell 1986). An "economic tragedy of the commons" or "economic overfishing" is also likely under state regulation of some common property resources. For example, fishermen compete away all their profits trying to get the fish first, as more people enter the fishery (Gordon 1954; Scott 1955). Limiting the number of fishermen does not solve the problem, because the remaining fishermen still compete with each other by becoming more efficient (Pearse and Wilen 1979).

### LOSS OF TRADITIONAL KNOWLEDGE AND TRADITIONAL MANAGEMENT REGIMES, CRISIS AND CHALLENGE

There is, however, a fourth option not considered by Hardin. In situations where local communities and groups can control the access of both outsiders and their own membership, communal resource management can be both possible and effective. A major research challenge has been to identify more precisely the conditions which make such community-based resource management viable (Ostrom 1988).

In North America, this challenge has a particular urgency. Regulatory budgets are shrinking, and in many areas government agencies are beginning to realize they cannot keep abreast of management pressures (Busiahn 1989; Pinkerton 1989a). Pressure comes especially from the growing demand for accountability: The public wants better environmental protection, and greater accountability from industrial

developers for their damage to public resources. The public also wants greater accountability of government to the public for its management decisions, especially in the area of fish and wildlife management.

Nowhere are these new directions more apparent than in the demands of Canada's aboriginal people for meaningful participation in resource management decisions which affect the territories and resources on which they depend. It should not be surprising that all case studies in this volume focus heavily on the management function of habitat protection. This is a key management concern, because of the rapid pace of industrial development. Major industrial projects, such as pulp mills, dams, or oil and gas pipelines, are being proposed or expanded, usually in territories where they would have impacts for years to come on the resources on which aboriginal people and others depend. Today, there is far more data, awareness, and public pressure surrounding potential industrial damage to natural resources than existed even when these cases were being developed.

Some court decisions are beginning to address the habitat protection crisis. A March 1990 Federal Court of Appeal decision (*Friends of the Oldman River Society v. Canada*) has recognized greater federal responsibility to review proposed industrial projects which could impact fish and wildlife. Federal departments of Fisheries and Oceans, Environment, and Indian and Northern Affairs, for example, are now obligated to go through an environmental impact assessment process, including public review, if so requested. This means that these federal agencies would have to produce data on whether specific resources could be damaged by development, even if a province claimed there would be no environmental impact. Since the province of Alberta continues construction of the Old Man River Dam while the decision is being appealed to the Supreme Court of Canada, it is evident that provincial support of this direction may not be easily secured.

Of course, greater federal powers and obligations to protect fish and wildlife habitat are no guarantee that aboriginal concerns will be heard. As this collection demonstrates, aboriginal perceptions of what is needed to protect habitat may differ greatly from government perceptions. In particular, the Old Crow paper notes the problems of getting environmental impact assessments to include a more than superficial understanding of what is at stake for Native people. It seems unlikely that the aboriginal perspective will have much impact on habitat protection decision-making unless the management rights of first nations receive greater recognition -- such as the quasi-sovereign status of some tribes in the United States -- or unless local planning can be binding on central agencies. These are the central concerns toward which all chapters point. The efforts being made by aboriginal communities to document their traditional knowledge and to integrate it into more comprehensive regimes for self-management and co-management are indeed timely. Canada still has an

opportunity to protect critical habitat for indigenous species of fish and wildlife on which native peoples depend.

Although the courts are increasingly recognizing aboriginal management rights in some areas, they are slow to define their breadth. Clearly habitat protection is only one among many areas of management where first nations seek greater participation. Comprehensive claims settlements in some areas have established new institutions through which aboriginal people and government agents make joint management decisions (Berkes 1989a; Doubleday 1989). Both these comprehensive agreements over large territories and other local, resource-specific agreements between governments agencies and local Native communities are really agreements in process: the practice of joint decision-making as spelled out in the principles of these agreements is still being worked out, and its viability is still to be tested.

All contributions in this volume underline two of the most difficult and sensitive areas in working out joint agreements. First, how can aboriginal traditional knowledge of resources be successfully incorporated into management plans? In other words, how can aboriginal groups whose understanding of their resources has enabled them to manage these resources in the past communicate effectively with government biologists, who are seldom trained to conceptualize management in the way aboriginal people do? Secondly, and more urgently, how can aboriginal groups protect the habitat of their fish and wildlife resources if they have limited access to the environmental impact assessment process?

As noted above, it would be a mistake to limit our consideration to habitat protection and data collection and analysis (as a scientist would label documenting traditional knowledge). These two areas of management are critical, but they are only a part of the entire management picture. It is useful to conceptually distinguish five other management functions: harvest regulation, resource enhancement, enforcement, resource allocation, and comprehensive long-range regional planning. Chapters in this collection refer to each of these functions in their discussions of what aboriginal managers have always done. Under aboriginal regimes, of course, these functions were all simply aspects of the socio-political system, and it is not meaningful to distinguish them. Co-operation with government agencies is facilitated by such distinctions, however. Separating different management functions also enables us to analyze the areas in which aboriginal and state management regimes are the farthest apart. This stimulates creative thinking about how they could work toward more effective partnerships.

In addition, a discussion of management as seven separate functions will enable us to better appreciate the scope and importance of aboriginal self-management regimes. These are themselves a resource, not simply as systems of traditional knowledge, but also as systems which carry out all the other

functions as well. Some economists conceptualize both traditional knowledge and the management regimes as “social capital”, because they represent “generations of learning about how to organize productively and is one of the most valuable forms of ‘capital’ any [people] has with which to pursue its economic development” (Wynne 1988). These regimes have been around a long time, and they are likely to represent appropriate adaptations to particular environments and resources (Orlove 1980; Smith 1983). The documentation of these regimes, and their incorporation into co-management agreements can benefit not only aboriginal people, but also the theory and practice of resource management, in general.

The challenge for Canada, then, is first to foster the documentation of the precious and fast-disappearing traditional knowledge of First Nations within its boundaries. The fact that this documentation is being carried out by these nations themselves is a first important step in assuring that it is properly understood and communicated. The next step in this challenge, taken up in the following section, is to further analyze the contribution of aboriginal self-management to the sound functioning of resource management, in general, and to potential co-management regimes, in particular.

## DEVELOPING CO-MANAGEMENT REGIMES

In this section, it will be helpful to separate out some of the management functions in traditional systems which are discussed in the papers holistically, as part of an entire social system. This will assist in clarifying their function to scientific managers.

### Enforcement

Among hunting and gathering societies, social pressure and religious instruction are mentioned as methods of enforcement in aboriginal times. To these may be added the role of specialized elders or record-keepers, who often had the role of regulating the rotation of the hunting territories among the extended group (Berkes 1989a). It may be useful to distinguish these mechanisms from those used by somewhat more hierarchical tribal societies, represented here by the Ehatesaht. Where a major resource (in this case salmon) is concentrated both seasonally and geographically, rather than being dispersed like game, authority too tends to be more concentrated in the hands of elders and chiefs. These then regulate the access of other tribal members to fishing opportunities. Although both types of authority may suffer in modern times from the erosion of some of these mechanisms and become less effectiveness with youth, different routes may be appropriate to each in revitalizing band or tribal self-regulation. Research is needed on which approaches are most appropriate for societies with different traditional uses of authority.

Insights may also be provided by existing documentation

of aboriginal strategies for revitalizing, reformulating, or reconstituting traditional mechanisms of authority or effective enforcement. For example, community-level management of forests in Nepal was re-created in many areas after the state failed to carry out adequate enforcement (Arnold and Campbell 1986). The Alaska Eskimo Whaling Commission and the Alaska Eskimo Walrus Commission (as documented in Freeman 1989 and Langdon 1989 respectively) also successfully revitalized or re-invented enforcement. These new institutions were formed because Eskimo whaling and walrus-hunting villages suffered a threat to their subsistence hunt from two quarters. On the one hand, international and national whaling and marine mammal protection agencies attempted to curtail their hunt, based on the belief that whale and walrus populations were endangered, and that many marine mammals were being struck and abandoned, or wasted. On the other hand, their own communities and youth needed better education about conservation. In response to the danger of losing their hunt, the Eskimo villages banded together to form the Alaska Eskimo Whaling Commission (AEWC), which produced a management plan for their whale hunt. The Eskimo Walrus Commission followed suit.

Importantly, this management plan included not only mechanisms for the setting of harvest quotas, but also strict enforcement for those taking more than their quota, or otherwise violating Eskimo guidelines for proper whale harvest. The Eskimo whalers took it upon themselves to convince outsiders that they were not endangering whale populations, that their harvest regulations were based on better scientific data than was available to the international observers, and that they strictly enforced their harvest quotas. University-based scientists played an important role in communicating to government agents and the scientific community the validity of the AEWC management plan. This successful demonstration of local enforcement was a key element in allowing self-management to continue, and also to form the basis of co-operative relations between local, national, and even international whale management regimes. Local efforts at enforcement can be more effective than government enforcement, as noted by the Dene, Ukkumuit and others. They can also be less costly (Ulla 1985).

The Alaska Eskimo examples also suggest a way in which the problematic cash/subsistence interface could be handled by new aboriginal institutions. As the Old Crow case study notes, most Native people want to be able to maintain traditional subsistence activities, and also participate in the cash economy. When local communities have no control over levels of participation in both economies, however, the cash sector may dominate and eventually erode the subsistence sector, as the Dene and others have observed (Alaska Department of Fish and Game 1984; Langdon 1984). Local management plans, enforced by the community, could integrate the two sectors of the local economy, and prevent the erosion of aboriginal authority and the subsistence sector by

the cash economy.

### **Comprehensive long-range regional or watershed planning**

Land use planning or management planning is mentioned in the Ehettesaht, Dene, and Old Crow cases as a hopeful, but still problematical, direction for entrenching traditional knowledge and self-management. The problem is: what force can comprehensive resource management plans devised by first nations have on government agencies? This question is particularly important when the management plan is an attempt to integrate different management functions such as resource enhancement and harvest regulation. Even more important can be attempts to look at cumulative impacts, as singled out by Old Crow, or to plan for a sustainable harvest in one area. If habitat protection is added, the plan is even more complex.

Some of the most powerful examples of forceful watershed planning which begin to include all these concerns are found in Washington State. The treaty tribes' fishing rights have been translated into regional planning in several ways. The tribes and the Washington Department of Fisheries have negotiated a comprehensive salmon management plan for Puget Sound. This includes procedures for joint decision-making about harvest regulation, enhancement, data collection and analysis, and allocation (Cohen 1986). The plan includes procedures for dispute resolution, and has been adopted as a court order, since it spells out principles of *U.S. versus Washington*, "the Boldt decision." More regionally-specific "sub-basin" or watershed plans, such as the Hood Canal Plan, cover the same management concerns on a more local basis, and are negotiated between the Department of Fisheries and the local tribe only. This type of plan is very valuable for the tribe, because the Department cannot create new recreational fisheries, cut back on enhancement projects, or otherwise disrupt agreed-upon procedures without the consent of the tribe. Consent must be the product of negotiation in which parties can argue for equity (e.g., hatchery cut backs must be distributed equally around the state) and meet each other half way (Pinkerton and Keitlah 1990).

Such regional plans improve management by forcing government managers to take a more comprehensive, integrated view of management functions, which may be carried out by different arms of the bureaucracy that communicate little with each other. For example, watershed planning forces hatchery production to be analyzed together with harvest management, so the two are not working at cross-purposes. Such holism is natural for the tribes, but less so for government. The integrated view also implies a more long-range view, which involves tracking changes for specific watersheds over longer time frames than is usual for government agencies. The Ehettesaht chapter reminds us of

not only the wealth of detailed local knowledge possessed by elders, but also the time depth of this knowledge, which has recorded long-term cycles in resource abundance in relation to other factors. These elders must be consulted in setting long-range local objectives for resource management.

Watershed planning is also used in Washington to integrate forest, wildlife, and fisheries management. The tribes have negotiated an agreement with the Departments of Fisheries, Wildlife, Natural Resources (forests), the Washington Forest Protection Association (the major timber companies) and the two major environmentalist umbrella groups in Washington. This Timber, Fish, and Wildlife Agreement of 1987 provides a framework for all these management agencies, including the tribes, to participate in the implementation of the agreement. The agreement provides flexible and site-specific guidelines for the protection of critical wildlife habitat and riparian zones along fish-bearing streams. The agreement includes a participatory research component, such that all parties will eventually agree on the level of protection which their joint research shows is necessary. The agreement represents a creative solution to the need for integrated management of different resources, and the need to resolve conflicts more flexibly than the courts allow (Fraidenburg 1989). It is, however, based at least partially on tribal rights to protect habitat which were recognized in the 1980 Phase 2 ruling of *U.S. versus Washington* (Cohen 1986). These rights fostered an alliance between the tribes and environmental groups which had been pressing for similar protective measures. This agreement has been gradually evolving in its application so that a broader range of forest management issues are now included than may have originally been intended. One issue now included is cumulative impacts, correctly identified in the Old Crow chapter as a key to effective environmental impact assessment. Another issue is sustainable rate of forest harvest, which is of vital importance to fish and wildlife resources. Both these issues deserve high priority in future research.

Watershed planning has also been used in Washington to produce water quality plans for a local area. These plans are the product of agreement among tribes and local interest groups for the protection and rehabilitation of local watersheds with particularly valuable marine, freshwater, and wildlife resources. Watershed plans have considerable force with other agencies, which are instructed by them to carry out certain aspects of the water quality improvement plan. These plans mandate co-operative planning among all interest groups at the local level, and require government agencies to work with the consensus of the local group. This produces an analysis of the local water quality problems which is holistic, because it includes all sources of pollution on the local level. It also produces an action plan for protection and rehabilitation which is comprehensive, and integrates the work of different agencies at a local level and in a way which is not normally possible. As such, water quality planning by local users also contributes to integrated resource management and the

reduction of conflict. Analysis of the feasibility of such planning in a Canadian institutional context would contribute important possible directions for regional planning.

### Data collection and analysis

Recent critiques of standard scientific modelling suggest that “adaptive management” may be a powerful and useful tool for achieving management objectives (Hilborn 1987). It may also have greater potential for incorporating aboriginal involvement in data collection and analysis (McDonald 1988). This is so, because adaptive management is based on response to change and uncertainty in ecological systems, and seeks to uncover a range of possibilities, rather than make precise predictions from a detailed understanding. Adaptive management is especially appropriate to attempts to understand large systems over the long term, much as holders of traditional knowledge see natural phenomena in terms of their exposure to long natural cycles (cf. Ehattesaht chapter).

Chaos theory (Gleick 1987) provides a mathematical basis supporting the central idea of adaptive management, in that it suggests an underlying order and range of possibilities, while exposing the basic unpredictability of an ecosystem. While conventional linear scientific models may be conceptually helpful, they are poorly suited to predicting events in dynamic, self-correcting ecosystems. These systems operate in a manner which is essentially non-linear and often counter-intuitive, according to patterns which are generally insoluble by conventional scientific means. The real world is made of a myriad of inter-dependent variables, where the effects of tiny events can multiply throughout a system, not diminished or absorbed as random errors that will cancel each other out in the long run. And regardless of the scale of the real system being considered, it can never be fully represented in a biological model. These points are important, because a great many systems are so fragile that the wrong management decision can easily lead to a crash of stocks. Likewise, a scientific model can fail to predict stock rebounding and inappropriately prohibit harvest of a plentiful resource (Langdon 1989; Freeman 1989).

The more non-linear such systems are, the more incompetent science is to describe and analyze them. They do lend themselves well to “adaptive management” or traditional management, however. The new mathematics of chaos theory, with its emphasis on the importance of description as a means of understanding systems, suggests that the complex cognitive maps developed by traditional managers are indispensable to the proper on-line management of natural ecosystems.

All of the papers in this collection either directly identify or indirectly suggest the need for monitoring of resource health by traditional local residents. More research should be done on the possible linkages between traditional knowledge and the paradigms of chaos theory and adaptive management. This

could include using aboriginal linguistic categories as clues to potentially useful scientific distinctions (Neitschmann 1989). Categories would also be improved by the inclusion of women as respondents, since women often harvest different resources, and possess different types of ecological knowledge, sometimes complementary to the knowledge of men (e.g., shellfish, medicinal plants, roots, berries, small game).

### Harvest regulation

Harvest regulation--controlling who harvests, when they harvest, where they harvest, and how they harvest -- is the most obvious and frequently-described aspect of management. It can be achieved without overtly or directly regulating all of these activities. An extensive and rich literature documents a multiplicity of ways in which harvest management is accomplished. One of the more interesting cases occurs in the Bahia region of Brazil, where government is unable to exercise any regulatory power (Cordell 1989). Local networks of boat captains and net bosses control when, where, and how fishing occurs. The system functions both to allocate space and to resolve conflicts. The boat captains were able to exclude outsiders and prevent overfishing until heavily mechanized and capitalized fleets from more distant ports came in with new gear which was difficult to regulate.

As in this example, technology can play a key role in the ability of a local group to exclude outsiders and regulate insiders. In the Maine lobster fishery, for example, “harbour gangs” and even individuals are able to exclude outsiders through surreptitious violence. Lobstermen produced their own regulations on size limits and trap tagging, afterwards persuading the state Department of Marine Resources to accept and even enforce these regulations (Bowles and Bowles 1989). This local management system appears to have stabilized human/resource relationship over time, because the number of fishermen has remained stable over time, indicating a probable sustained-yield state. The benefits of this situation can include less enforcement exercised by the state, larger-sized lobsters, and less effort exerted to catch the same amount of lobster (Acheson 1975).

Some analysts believe that harvest regulation is a by-product of the intention to increase the efficient return to effort, and therefore not conscious conservation (Hames 1987). In pre-industrial situations, it may not matter whether people say a system is for the purpose of conservation, as long as it functions to prevent overharvesting. As is evident in papers in this collection, harvest regulation is often part of a social system which serves many other functions as well. In the modern world of co-operation between local and bureaucratic systems, however, it is probably desirable if conservation intentions are conscious. It is also useful not to assume conservation is being automatically practised, but to identify whether the conditions are present which make conservation possible. One suspects that the Brazilian



example offered by Hames above could not work as a conservation system under conditions of population expansion by outside tribes, because under these conditions the group cannot adequately exclude outsiders from the territories it harvests. Co-management regimes would do well to foster territoriality as a necessary component of successful harvest regulation at the local level, in order to reap the benefits of locally-exercised harvest regulation. As was evident in the discussion of local enforcement, overharvesting is less likely to occur when the watchful eyes of harvest managers and enforcers are located in the community instead of external to it.

### Enhancement

If resources are being managed on a sustained-yield basis, enhancement is superfluous. As a result, it is not often considered necessary by traditional managers. However, hunter-gatherers have for centuries practised burning of grasslands and forests to enhance grazing for game, berry production, insect control, and other functions (Lewis 1982). Such enhancement is often broad-spectrum and may not have the specific single intent of government-managed enhancement. Enhancement may also be part of a system of harvest management (Miller 1989).

In modern times, enhancement may be appropriate and even necessary if resources have been severely impacted by development or overharvesting. In some cases, however, specific enhancement projects may be permitted or encouraged by government in one area to compensate for habitat destruction they allow in another area. Department of Fisheries and Oceans' policy of "no net loss" of salmon production is a case in point: the technological possibility of mass producing hatchery salmon can be used to allow industrial development which eliminates entire salmon runs. Local communities which depend on (and have what could be called a legal interest in) specific runs of salmon have a strong interest in protecting specific environments, the wild stocks and their genetic diversity. They may feel that hatchery fish are not an adequate replacement, given the problems of hatchery fish, and wild-hatchery interactions (Walters 1988). The point is that local communities should be involved in the planning of enhancement projects such as hatcheries, as their perspective on the desirability of such projects is obviously quite different from government's. Local control of enhancement is perhaps most advanced in Alaska, where regional fishermen's associations conduct local enhancement activities, and sit on joint boards with government to plan enhancement in their region (Amend 1989). In this context, fishermen in local communities can effectively veto enhancement projects which are not in their interest, and which they believe will damage the resource.

Joint enhancement conducted by Native and non-Native fishing interests can be a powerful way of pulling together

groups which share a common resource. Such groups invariably stand to gain from working together. Together with joint habitat protection, joint enhancement efforts can affirm and solidify collective action and collective institutions for improved management. These joint actions are often necessary to counterbalance the polarizing struggle which invariably occurs over allocation. While government will probably play a role in allocation among diverse interest, such is not necessarily the case on a more local level.

### Allocation

Allocation is usually a feature of harvest management in community-based management regimes. Control of access often involves choices about who has access and for how long. Similar to the Ehattesaht, the Gitksan-Wet'suwet'en chiefs of northern British Columbia control access to their inherited fishing spots and allocate fishing time to kin (Morrell 1985). The Ponam Islanders of Melanesia have an extremely complex system of allocating catching rights and catch through inherited territorial rights, species rights and gear rights (Carrier and Carrier 1989). In Japan, the local Fishermen's Co-operative Association does all the allocation internally and the government does not interfere.

The role of chiefs, elders, or retired fishermen as mediators and consensus builders is critical to the functioning of local allocation systems. From the perspective of government, it is advantageous to avoid the difficulty of establishing criteria for allocation which will be perceived as just and equitable in the local community, not to mention to cost of managing conflict. When conflict over allocation is settled in the local community, or prevented from even arising, management costs are avoided.

### CONCLUSIONS AND DIRECTIONS FOR FUTURE RESEARCH

Existing systems of aboriginal management or co-management could be said to make contributions to superior resource management in several ways. Enforcement is more effective and less costly. Regional planning is more holistic than conventional management, integrating and co-ordinating different management functions on a local basis. Regional planning also can integrate management of different resources so that they do not conflict, as well as integrate plans to prevent or clean up different sources of pollution to the same local environment. Data-gathering and analysis by holders of traditional ecological knowledge is likely to reflect a finer understanding of long cycles and variance in the system than may be possible with limited scientific data. Harvest management on the local level has the potential of tailoring effort to what is sustainable, and is probably more likely than state-managed systems to prevent over exploitation. Enhancement and allocation can both be effectively conducted at the local level, and a highly-desirable avoidance of costs can result.

Although we know a great deal about the general conditions which make community-based resource management viable, there is much we do not know about how community-based regimes and state regimes can work together. We need to know more about how traditional forms of authority can be best incorporated into new institutions for co-management or revitalized self-management. We need to research the potential contribution of traditional knowledge to scientific knowledge, and to different modes of managing harvest. We need to know how to make regional plans for sustainable and balanced development binding on central agencies, if there are not adequate court decisions to accomplish this. Finally, we need to know the conditions under which bureaucracies are more amenable to sharing power with local resource users, and thus realizing the benefits of co-management.

These research needs might be conceptualized as parts of a whole in the following fashion. The most overarching need is to model, sustainable management in an integrated fashion, including rates of harvest of various species, and cumulative impacts of industrial development on fish and wildlife habitat. This involves both accumulation and amalgamation of technical and traditional knowledge, and also analysis of appropriate institutional forms for assessing and monitoring technical data, and for mediating conflict among different harvesters, and between harvesters and industrial developments, such as logging, pulp mills, hydroelectric projects, etc.

To begin to accomplish this, Native organizations, possibly acting jointly with other local interests, might first want to choose appropriate "sustained yield" units, using watershed or ecosystemic units, as practicable. An inventory of resources and an analysis of how these are likely to be affected by current proposals is the next step. Current harvest plans for the boreal forest and associated pulp mills in Manitoba, Saskatchewan, Alberta, and British Columbia may be the most pressing concern for northern Native groups in western Canada, for example. Since timber harvesting is frequently not planned as sustainable forestry, and since the impact of timber harvesting on fish and wildlife may not be a significant factor in governmental decision-making, Native communities need to define their own standards of integrated resource management, and work toward expressing these as long-term regional resource management plans. Native communities may need to explore the possibility of including local allies in the research and planning process, as a balance to the perceived mandate of government agencies to plan without taking these concerns into account.

To illustrate further, using the above example, research on sustainable forestry could produce a sustainable rate of harvest, and an analysis of alternative forestry practices which would diminish the impact on wildlife and fish habitat. The "new forestry" being considered in the Pacific Northwest, for example, advocates smaller clearcuts, corridors for wildlife

connecting blocks of old growth, non-suppression of natural succession, the leaving of snags, large buffer strips along streams, and alternative forestry practices on steep terrain. Traditional ecological knowledge could inform the analysis of forest practice standards advocated by Native groups, along with an analysis of what long-term regional harvest rates would be appropriate.

Any model for sustainable forestry/fish/wildlife would need to include a monitoring device to correct the model on an ongoing basis, and thus be incorporated into the regional plan. It is generally acknowledged, for example, that the impact of the James Bay hydroelectric project is greater than was predicted. As adaptive management procedures and chaos theory suggest, the degree of unpredictability means that a local monitoring and reassessment capacity needs to be part of the long-term plan. The monitoring and reassessment function would ideally be located in the local communities, and also involve consultation with government and possibly industry. Whether the monitoring function should include management and/or labour should also be researched. The Washington State Timber, Fish, and Wildlife Agreement included only management, while the Tin-Wis Coalition in British Columbia prefers to explore models for the incorporation of local trade unions, whose members also depend on the resources. In the latter model, labour is viewed as having a long-term commitment to local sustainable harvesting, while management is viewed as having a transnational perspective which defines labour and capital as highly mobile and sees "sustained yield" in international rather than local ecological terms. Research should explore the range of institutional arrangements available as learning experiences, and evaluate which would come closest to tapping the potential and expressing the needs of the specific situation.

An additional aspect of research on institutional forms could focus on how government agencies have changed in jurisdictions practising full-blown co-management. Naturally, government agencies cannot be expected to share power easily and swiftly with community-based management institutions. Preliminary research suggests that government agencies involved in co-management arrangements find these to be enormously beneficial both to themselves and to the resource, once they are established. Research on the benefits of co-management to government agencies may lower some of the resistance of government agencies to institutional arrangements which will be necessary to conduct effective shared decision-making and management practices.

## REFERENCES

Acheson, J. 1975. The lobster fiefs: economic and ecological effects of territoriality in the Maine lobster industry. *Human Ecology*, 3: 183-207.

- Alaska Department of Fish and Game, Subsistence Division. 1984. *Subsistence-Based Economies in Coastal Communities of Southwest Alaska*. Juneau: Technical Paper Number 89.
- Amend, D.A. 1989. Alaska's regional aquaculture associations: co-management of salmon in southern Southeast Alaska. In E. Pinkerton (ed.). *op cit.* 125-134.
- Arnold, J.E.M. and J.G. Campbell. 1986. Collective management of hill forests in Nepal: the community forestry development project. In National Research Council. *op cit.* 425-480.
- Befu, H. 1980. Political ecology of fishing in Japan: techno-environmental impact of industrialization in the Inland Sea, *Research in Economic Anthropology*, 3 :323-347.
- Berkes, F. 1989a. Co-management and the James Bay Agreement. In E. Pinkerton (ed.). *op cit.* 181-208.
- Berkes, F. (ed.). 1989b. *Common Property Resources. Ecology and Community-Based Sustainable Development*. London: Belhaven Press.
- Berkes, F. *et al.* 1989. The benefits of the commons. *Nature*, 340.
- Blitz, A. 1987. Marine fishing in the Philippines. *Cultural Survival Quarterly*, 1 1(2): 12- 14.
- Bowles, F. and M. Bowles. 1989. Holding the line: property rights in the lobster and herring fisheries of Matinicus Island, Maine. In J. Cordell (ed.). *op cit.* 228-257.
- Bromley, D.W. 1989. *Economic Interests and Institutions. The Conceptual Foundations of Public Policy*. Oxford: Basil Blackwell.
- Carrier, J. and A. Carrier. 1989. Marine tenure and economic reward on Ponam Island, Manus Provinces. In J.W. Cordell (ed.) *op cit.* 94- 120.
- Chemella, J. 1987. Endangered ideologies: Tukano fishing taboos. *Cultural Survival Quarterly*, 11(2):50-52.
- Cohen, F.G. 1986. *Treaties on Trial. The Continuing Controversy over Northwest Indian Fishing Rights*. Seattle: University of Washington Press.
- Cohen, F.G. and A. J. Hanson (eds.). 1989. *Community-Based Resource Management in Canada: An Inventory of Research and Projects*. Ottawa: Canadian Commission for UNESCO.
- Cordell, J.W. (ed.). 1989. *A Sea of Small Boats*. Cambridge, MA: Cultural Survival.
- Cordell, J. W. and J. Fitzpatrick. 1987. Torres Straits: cultural identity and the sea. *Cultural Survival Quarterly*, 1 1(2): 15-1 7.
- Ciriacy-Wantrup, S.V. and R.C. Bishop. 1975. "Common property" as a concept in natural resource policy. *Natural Resources Journal*, 15:7 13-27.
- Davis, S. 1984. Aboriginal claims to coastal waters in northeastern Arnhem Land, Northern Australia. In Ruddle and Akimichi (eds.). *op cit.* 213-52.
- Doubleday, N. 1989. Co-management provisions of the Inuvialuit Final Agreement. In E. Pinkerton (ed.). *op cit.* 209-227.
- Emmerson, D.K. 1980. *Rethinking Artisanal Fisheries Development: Western Concepts, Asian Experiences*. Washington, D.C.: World Bank Staff Working Paper 423.
- Fernando, S. *et al.* 1985 The impact of Buddhism on the small-scale fishery of Sri Lanka. In T. Panayotou (ed.). *op cit.* 205-2 10.
- Fox-man, S. 1980. The location of fishing spots in a Brazilian coastal village. In A. Spoehr (ed.). *op cit.* 15-24.
- Fraidenburg, M.F. 1989. The new politics of natural resources: negotiating a shift toward privatization of natural resource policymaking in Washington State. *Northwest Environmental Journal*, 5:2 1 1-240.
- Freeman M.M.R. and L.N. Carbyn (eds.). 1988. *Traditional Knowledge and Renewable Resource Management in Northern Regions*. Edmonton: Boreal Institute for Northern Studies.
- Freeman M.M.R. 1989. The Alaska Eskimo Whaling Commission: successful co-management under extreme conditions. In E. Pinkerton (ed.). *op cit.* 137-53.
- Gleick, J. 1987. *Chaos: Making a New Science*. New York: Viking.
- Gordon, H.S. 1954. The economic theory of a common property resource: the fishery. *Journal of Political Economy*, 62: 124-42.
- Hames, R. 1987. Game conservation or efficient hunting? In B. McCay and J. Acheson (eds.). *op cit.* 92-107.
- Hardin, G. 1968. The tragedy of the commons. *Science*, 162: 1243-1248.
- Hilbom, R. 1987. Living with uncertainty in resource management. *North American Journal of Fisheries Management*, 7: 1-5.

- Ishihara, Y. 1984. The Ashihama nuclear power station and the fishermen of Nantocho. *Kogai Kenkyu*, 14(1): 17-25.
- Johannes, R.E. and J.W. MacFarlane. 1984. Traditional sea rights in the Torres Straits Islands, with emphasis on Murray Island. In K. Ruddle and T. Akamichi (eds.). *op cit.* 235-266.
- Langdon, S.J. 1989. The Alaska Eskimo Walrus Commission. In E. Pinkerton (ed.). *op cit.* 154-169.
- Lewis, H. 1982. Fire technology and resource management in aboriginal North America and Australia. In N. Williams and E. Hunn (eds.). *op cit.* 45-68.
- McCay, B.J. and J. Acheson (eds.). 1987. *The Question of the Commons: the Culture and Ecology of Communal Resources*. Tuscon: University of Arizona Press.
- McDonald, M. 1988. Traditional knowledge, adaptive management and advances in scientific understanding. In M.M.R. Freeman and L.N. Carbyn (eds.). *op cit.* 65-71.
- Miller, D. 1989. The evolution of Mexico's spiny lobster fishery. In F. Berkes (ed.). *op cit.* 185-98.
- Moorehead, R. 1989. Changes taking place in common property resource management in the inland Niger Delta of Mali. In F. Berkes (ed.). *op cit.* 256-72.
- Morrell, M. 1985. The Gitksan and Wet'suwet'en Fishery in the Skeena River System. Unpublished report, Fish Management Study, Hazelton, B.C.
- National Research Council. 1986. *Proceedings of the National Research Council Conference on Common Property Resource Management*. Washington D.C.: National Academy Press.
- Neitschmann, B. 1989. Traditional sea territories, resources and rights in Torres Strait. In J. Cordell (ed.). *op cit.* 60-93.
- Orlove, B. 1980. Ecological anthropology. *Annual Review of Anthropology*, 9: 23-57.
- Ostrum, E. 1988. Institutional Arrangements and the Commons Dilemma. In V. Ostrum *et al* (eds.). *op cit.* 101-139.
- Ostrum, V., D. Feeny and H. Picht (eds.). 1988. *Rethinking Institutional Analysis and Development: Issues, Alternatives and Choices*. San Francisco: International Center for Economic Growth.
- Panayotou, T. (ed.). 1985. *Small Scale Fisheries in Asia: Socioeconomic Analysis and Policy*. Ottawa: International Development Research Centre.
- Pearse, P. and J. Wilen, 1979. Impact of Canada's Pacific salmon fleet control program. *Journal of Fisheries Research Board of Canada*, 36: 764-69.
- Pinkerton, E.W. 1989a. Attaining better fisheries management through co-management: prospects, problems, and propositions. In E. Pinkerton (ed.). *Co-Operative Management of Local Fisheries*. 3-33.
- Pinkerton, E.W. (ed.). 1989b. *Co-operative Management of Local Fisheries: New Directions in Improved Management and Community Development*. Vancouver: University of British Columbia Press.
- Pinkerton, E.W. and N. Keitlah. 1990. *The Point No Point Treaty Council: Innovations by an Inter-Tribal Management Co-Operative*. Report for the Point No Point Treaty Council.
- Ruddle, K. and T. Akimichi (eds.). 1984. *Maritime Institutions in the Western Pacific*. Osaka: National Museum of Ethnology.
- Ruddle, K. and R.E. Johannes (eds.). 1985. *The Traditional Knowledge and Management of Coastal Systems in Asia and the Pacific*. Jakarta Pusat, Indonesia: UNESCO.
- Sakiyama, T. 1984. Fisheries co-operatives in southeast Asia: an institutional perspective. In K. Ruddle and T. Akamichi (eds.). *op cit.* 183-202.
- Sawyer, A. 1988. The Putu Development Association: a missed opportunity. In V. Ostrum *et al* (eds.). *op cit.* 247-78.
- Scott, A. 1955. The fishery: the objectives of sole ownership. *Journal of Political Economy*, 63: 116-24.
- Short, K. 1987. Toyko Bay fishermen struggle for survival. *Cultural Survival Quarterly*, 11(2): 23-25.
- Smith, E.A. 1983. Evolutionary ecology and the analysis of human social behaviour. In R. Dyson-Hudson and M. Little (eds.). *Rethinking Human Adaptation: Biological and Cultural Models*. Boulder. Westview Press, 23-48.
- Sparck, H. 1987. Japanese salmon fleet threatens Yukon native economy. *Cultural Survival Quarterly*, 11(2): 48-49.
- Spoehr, A. (ed.). 1980. *Maritime Adaptations: Essays on Contemporary Fishing Communities*. Pittsburg: University of Pittsburg Press.
- Stephens, S. 1987. Chernobyl fallout: a hard rain for the Sami. *Cultural Survival Quarterly*, 11(2): 66-71.
- Taylor, L. 1987. And the river shall run red with blood. In B. McCay and J. Acheson (eds.). *op cit.* 290-307.

Ulla, M. 1985. Fishing rights, production relations, and profitability: a case study of Jamuna fishermen in Bangladesh. In T. Panayotou (ed.). *op cit.* 2 11-222.

Walters, C.J. 1988. Mixed-stock fisheries and the sustainability of enhancement production for Chinook and Coho salmon. In W.J. McNeil (ed.). *Salmon Production, Management, and Allocation: Biological, Economic and Policy Issues*. Corvallis: Oregon State University Press.

Williams, N.M. and E.S. Hunn. 1982. *Resource Managers: North American and Australian Hunter-Gatherers*. Canberra: Australian Institute for Aboriginal Studies.

Wynne, S. 1988. Institutional resources for development among the Kgalagadi of Botswana. In V. Ostrum *et al* (eds.). *op cit.* 2 13-246.

Zann, L.P. 1985. Traditional management and conservation of fisheries in Kiribati and Turvalu Atolls. In K. Ruddle and R. Johannes (eds.). *op cit.* 53-78.

## 7. A PRELIMINARY RESEARCH PROSPECTUS

### The Assembly of First Nations and The Inuit Circumpolar Conference <sup>1</sup>

In November, 1990, the Canadian Environmental Assessment Research Council (CEARC) approached a number of Native organizations for recommendations on the incorporation of traditional ecological knowledge (TEK) into environmental assessment (EA). This preliminary research prospectus was compiled jointly by the Assembly of First Nations (AFN) and the Inuit Circumpolar Conference of Canada (ICC) in response to that request. It describes their approach to research activities in this field, includes a brief overview of existing information, lists both AFN and ICC priorities and recommendations and identifies present and future research goals and objectives. Appendix 1 identifies some of the obstacles to incorporating TEK into environmental assessment processes, and suggests how these might be overcome.

What is now referred to as traditional ecological knowledge (TEK), is a growing field of study in which Native people have been increasingly dominated by non-Native experts, analysts, and consultants. As a result, knowledge which could - and should - be used for the benefit of Native people and their communities (in accordance with their own priorities and values) has tended to be defined and appropriated by non-Native researchers. This, and the fact that there is so little documentation reflecting the environmental problems and perspectives of Native peoples across Canada, strongly suggests the need for a comprehensive environmental assessment blueprint, developed by and for Native people. In addition to providing an invaluable planning tool, such a map of environmental priorities and traditional knowledge could also be used to facilitate future discussions at the local, regional and national levels, as well as to promote a broader dialogue between Native and non-Native communities. Moreover, the environmental research capacity of First Nations has grown the point where they increasingly have the necessary expertise to produce such a document for themselves.

#### ASSEMBLY OF FIRST NATIONS' FINDINGS

The Assembly of First Nations' findings and recommendations are based upon a preliminary literature search of documentation relevant to traditional ecological knowledge. Based on a key word analysis, the most pressing concerns of First Nations with respect to TEK and

environmental assessment were compiled. The full listing of identified issues and recommendations appears in Cole and Bechard (1991) and other references cited in Appendix I. The present discussion is restricted to the most prominent concerns only, of which there are five:

1. Joint management policies must be part of environmental assessment, to promote and ensure First Nations' participation from the outset. It is clear from the number of times this recommendation was proposed that First Nations have the strongest interest in establishing a co-operative working relationship with the Government of Canada, one which could benefit everyone through the integration of TEK and EA, but one which has not as yet been realized.
2. Independent aboriginal government environmental assessment processes must be established. The heart of this issue is the question of jurisdiction, which has always been the source of controversy between First Nations and the Government of Canada. From a First Nation perspective, independent environmental assessment by aboriginal governments is simply another form of self-government, our right to which has never been surrendered or extinguished. Thus, the issue of separate environmental assessment centres on the devolution of authority to First Nations' governments.
3. The recognition of traditional rights must go hand in hand with measures to protect the local institutions that enforce responsibility in resource use. This recognition must also give local communities a decisive voice in the decisions about resources. First Nations have long managed their own resources, in accordance with their own values and beliefs. Any new environmental assessment process must incorporate these.
4. TEK must be fully documented and baseline data established. In order to effectively protect the environment, planning must be implemented which incorporates all the important ecological, social, political, economic, and cultural variables which comprise TEK. In order to facilitate such planning, TEK baseline data are required.

---

<sup>1</sup>A number of people contributed to the development of this Prospectus: Part II was prepared with the assistance of Rhoda Inukshuk; Part III was prepared with the assistance of David Cole and Chris Bechard; and a critical review was provided by Sheila Van Wyck.

5. First Nations' governments have the right and the obligation to protect the environment. The prominence of this recommendation stems from aboriginal attitudes to the environment. First Nations have long recognized that the natural world is not inexhaustible, and they have developed effective methods to balance exploitation and sustainable development. With the introduction of new resource users and practices, First Nations have attempted to integrate the new elements in order to re-establish the balance which they have continuously sought. This balance can only be obtained through co-operation and sharing of information, and a holistic approach to the environment.

### **INUIT CIRCUMPOLAR CONFERENCE FINDINGS**

The findings and recommendations of the Inuit Circumpolar Conference are based on personal interviews with select informants and informal discussions with other knowledgeable Inuit; they thus reflect a community-based methodology which complements that of the Assembly of First Nations' literature review. There are five main conclusions:

**1. Inuit must have a strong voice in any development of their sensitive environment.**

Without their input, there will always be a missing link that threatens the people, the animals, and the land itself. This is because Inuit see themselves as a fundamental part of the environment, with a responsibility to oversee its well-being; they do not -- and cannot -- stand apart from it. The Inuit view of the environment, and therefore of environmental assessment, is holistic and is closely associated with their concept of health. In Inuit teaching, health is characterized by mental, physical, and spiritual balance; it refers to all life on earth, including all living creatures, plants, lakes, rivers, seas, sea ice, and air. There is nothing more important to Inuit, therefore, than good health, a clean environment, and peace.

**2. It is clear that Inuit have a strong interest in participating as equal partners in an assessment process which takes their concerns and their input seriously.** They seek meaningful involvement whenever their homelands, environment, or resources are to be affected. They do not oppose development, but they do wish to protect their people and their environment against any projects or plans which would be detrimental to them.

**3. Inuit do not wish to be just another source of information in the environmental assessment process; rather, they seek equal partnership in the research field.** Although there are many books and

countless studies about the North, they are usually written by non-Inuit whose views seldom reflect the culture and values of Inuit. TEK, therefore, should be developed primarily from within, by persons with respect for, and understanding of, Inuit language, culture, and customs. Adequate funding and additional training must be made available for such purposes.

**4. Inuit are under pressure from their elders to communicate Inuit TEK to non-Inuit, and to convince them that the Inuit way is a valuable alternative to mainstream environmental management.** There must be a forum to sit down together, with a willingness to co-operate and seek mutual understanding. So far, most Inuit organizations have been ineffective in bridging the gap between Inuit society and non-Inuit society. The incorporation of Inuit TEK into environmental assessment processes is one means of addressing this important problem, for the good of all.

**5. Inuit TEK must be fully documented.** Inuit realize that there is an urgent need to work with the elders who still have the skills and knowledge to safeguard the environment, in all its essential economic, cultural, and spiritual dimensions. Inuit are taught to respect the elders, the environment, and all living creatures, and they recognize the need to share their traditional knowledge and skills with non-Inuit.

### **RESEARCH AGENDA**

In order to develop a comprehensive view of TEK and how it can strengthen the environmental assessment process, the following research components and tasks are recommended.

**1. Undertake a thorough literature search, preferably on a regional basis (i.e., most provinces and territories).**

- Identify researchers and research institutes.
- Collect and compile annotated bibliography of TEK and related topics (i.e., subsistence, indigenous resource allocation, etc.).
- Identify principles and philosophies associated with TEK.
- Compile and write up, (a) full and, (b) regional bibliographies.

**2. Prepare comprehensive case studies of at least one community in each region (in some provinces, a northern and a southern community would be ideal).**

- Combine documentary and field research.
- Identify socio-cultural practices & values associated with TEK by interviewing elders, women, hunters, trappers, etc. to find out: How

resources are allocated? Who utilizes them? What do they use them for? When? What methods are employed? How is knowledge transferred within the community? What kinds of records are kept? How are disputes settled? How is community adjustment to environmental impact(s) accomplished? What form does future planning take?

- Compile and write up each case study for comparative purposes.

### **3. Compare regional materials and development of a comprehensive picture of TEK across Canada.**

**4. Re-analyze environmental assessment (and existing legislation) in light of (1) - (3), and identify where and how TEK can improve this process.**

**5. Prepare a draft report for endorsement by Native communities, and for circulation among researchers and government agencies for discussion purposes.**

- Request comments and suggestions, and follow-up on the requests.

**6. Revise the report in light of (5) and the overall goal, which is a comprehensive TEK blueprint to be used by all individuals, communities, and governments involved in environmental issues.**

---

For more information on traditional ecological knowledge and the environmental assessment review process, or on the details of this prospectus, please contact:

Laurie Montour  
Environmental Co-ordinator  
Assembly of First Nations  
47 Clarence Street, #300  
Ottawa, Ontario  
K1N 9K1  
Phone: (6 13) 236-0673

Nancy Doubleday  
International Environmental Co-ordinator  
Inuit Circumpolar Conference  
170 Laurier Ave. West, #501  
Ottawa, Ontario, K1P 5V5  
Phone: (6 13) 236-2642

---

## **APPENDIX I. INCORPORATING TRADITIONAL KNOWLEDGE INTO ENVIRONMENTAL ASSESSMENT: BARRIERS AND SOLUTIONS**

Aboriginal people have always had great concern for the welfare of future generations and the natural conditions which we will pass on to them. For our part, we have always recognized the delicate relationship between a healthy people and a clean environment. For thousands of years, aboriginal peoples' holistic philosophies of sustainable development through long-term planning and appropriate technology nurtured a land where there was virtually no permanent environmental destruction prior to European settlement and colonization.

The arrival of newcomers into our territories, and the environmental destruction they have wrought, has only served to deepen our concern. Given the extent of the damage they have caused, -- and continue to cause - aboriginal peoples must be granted the opportunity to establish a new and remedial relationship with Canada, one which recognizes our inherent right and ability to protect a healthy ecosystem. As the World Commission on Environment and Development reported in 1987:

*Some communities -- so called indigenous or tribal peoples -- remain isolated because of such factors as physical barriers to communication or marked differences in social or cultural practices...the isolation of many such people has meant the preservation of a traditional way of life in close harmony with the natural environment...*

*These communities are the repositories of vast accumulations of traditional knowledge and experience that links humanity with its ancient origins...the larger society could learn a great deal from their traditional skills in sustainably managing very complex ecological systems.*

The biggest barrier to Native involvement in environmental protection is our lack of legislative authority. Even though our aboriginal rights are protected in the Constitution, and despite the fact that we have always had jurisdiction historically and philosophically, there is little or no legislative authority afforded us to exercise those rights in the area of conservation.

Furthermore, even though the land claims process is theoretically designed to resolve historical land loss, the flaws



in the existing system only serve to exacerbate the problem of jurisdiction. We have been working long and hard to improve the land claims process, but we have been met with a profound lack of political will to make the necessary changes. And while the court cases drag on and on, many of the guardians of TEK -- our elders -- are dying off. Despite the widespread revival of cultural awareness in our communities, the time for action is now, while the full wealth of their knowledge is still available to us.

Another important barrier is the lack of recognition of TEK as a valuable component in environmental assessment processes, and the consequent lack of resources directed to its collection and analysis. For the most part, TEK remains to be recorded. Moreover, the non-Native scientists and academically trained professionals who do recognize the value of TEK have tended to appropriate it for their own purposes; as a result, our own internal capacity for environmental management has been neither tapped nor enhanced. And make no mistake, the capacity is there in our communities; it awaits only recognition and resources to fully develop on a Canada-wide basis.

There are many contemporary examples of community-based projects which illustrate that aboriginal people have both deep-rooted concerns and practical experience with the environmental issues identified in the Green Plan framework. A sample of such projects, chosen to illustrate the variety which exists across Canada, is presented below. These, and others like them, show conclusively that our unique world view has something important to offer, and that it can -- and should -- be combined with mainstream scientific research and technology to address urgent environmental problems. The dichotomy between TEK and conventional "scientific" knowledge is false.

1. In 1988, the Nuu-chah-nulth people of Vancouver Island, B.C. began to notice oil washing up onto the shores of their territories. Amidst futile bickering between the provincial and federal governments about who was to bear the costs of clean-up, the Tribal Council began to clean the oil up itself. It hired a professional biologist to assess the damage, and continues to monitor the effects of the spill on the food chain.

2. The forest fires that break out in northern Manitoba each summer are of great concern to the many First Nation communities in the area. Dissatisfied with existing guidelines that gave remote communities low priority in fire fighting response, First Nation groups in 1989, began to look for alternative mechanisms to protect their communities. They designed a special emergency team to be on call, but bickering between the different levels of government has meant that funding is still not available.

3. The Walpole Island First Nation in southwestern Ontario began operating an air monitoring station in 1988. The reserve is subjected to various emissions from Sarnia, Windsor, and Detroit industrial centres. Although the programme is very successful and one of the few stations in Canada to monitor heavy-duty airborne contaminants, the annual funding is never assured.

4. Concern over the rising level of pollution in Lake Ontario, and indeed in all of the Great Lakes, led the Mohawks of the Bay of Quinte to initiate a water study in 1990. Initial findings have shown that the majority of community water is not fit for drinking,

5. The Algonquins of Barriere Lake (Quebec) have been subjected to intense logging in their traditional territories which has severely disrupted their land-based economy. The community has been agitating for a moratorium on existing forestry management agreements, as well as researching their impact on the environment. In addition, the community has been working to bring the federal and Quebec governments to the table in order to develop a conservation strategy.

6. In 1981, the federal government sanctioned the use of Innu land in Labrador for low-level flight testing. Despite the fact that these have resulted in the rapid depletion of the caribou herds (confirmed by Innu hunters and scientific researchers alike), the government has so far refused to take action.

Thus, it is clear that environmental assessment is presently being carried out by many First Nations for issues at the community and regional levels. In some instances, assessment processes are well developed and frequently used; in others, they occur as an integral part of the process of Band capital planning, environmental management, or other community developments. Some, for instance, have internal mechanisms for reviewing the location of housing, waste and water systems, and other community facilities. It is absolutely crucial, therefore, that the existing expertise be further developed, and that existing and proposed environmental assessment process do not conflict with, and ultimately subvert, the local community practices that have long been in place.

Lest there be any question that our recommendations have already been addressed, we have a number of concerns about the proposed federal Environmental Assessment Act legislation (Bill C-78) that are summarized here. At the most general level, the legislation is too narrow, and should be broadened to include all matters that are within federal jurisdiction. In addition, the use of discretion by proponents and ministers should be minimized and subject to specific

criteria. Moreover, the assessment process should be mandatory, and the decisions reached should be binding (although subject to an appeal process), and enforceable. The assessment process should be independent and free from interference, political or otherwise; while it is under way, no work should be carried out on the project under review, directly or indirectly. We also feel that full and meaningful public participation at all levels of the process should be built into the Act, and that adequate intervenor funding should be provided for in the legislation so that its allocation is not subject to political influence. Furthermore, the process should include consideration of development alternatives, including the recognition that these may include outright refusal of any project, no matter how environmentally viable. Finally, all decisions should be subject to mandatory and independent follow-up monitoring.

In addition to these general concerns, we have a number of comments to make about the proposed Act from a specifically aboriginal perspective. In the first place, all assessment legislation must recognize and enshrine the Constitutional protection of aboriginal and treaty rights, as well as the fiduciary obligation of the federal government to aboriginal people. Secondly, where development may affect aboriginal rights and lands, the First Nation government(s) affected must have the right to conduct their own environmental assessment, independently of other jurisdictions. And finally, First Nation government(s) and the federal authority must be empowered to conduct joint assessment reviews as equal partners. The changes that we have recommended above are designed to realize this goal.

First Nations generally agree with the World Commission on Environment and Development that indigenous peoples hold the key to the philosophies, technologies, and land use patterns which could bridge the gap between steady over-exploitation of the planet's resources and the goal of sustainable development. We view the sustainable development principles of stewardship, shared responsibility, and conservation as a fundamental part of present Native culture and practice, as they always have been. First Nations have been seeking recognition and a more direct role in the management and allocation of resources in their traditional areas, as well as pressing for joint management regimes.

What we want now is the legislative authority to become equal partners in the decision-making process, as well as increased levels of funding to enable us to utilize our existing TEK resources (both human and technological), and to develop new ones (through academic education and technical training). By these means, our communities will be empowered to take their rightful place in the environmental assessment process and to make a valuable contribution to resource management and conservation.

That we have long been successful resource managers and practitioners is attested to by the fact that, where we have control, our environment has continued to provide commercial and domestic sustenance, with minimal government intervention, and over long periods of time. We now seek the agreements, the opportunities, and the tools to create the necessary partnership with resource developers and other levels of government that will ensure that sustainable development becomes a reality for all future generations.

## APPENDIX II. REFERENCES AND INFORMATION SOURCES

Assembly of First Nations. 1990. Memorandum to Environmental Committee. Ottawa. December 19.

Assembly of First Nations. 1990. Draft for Discussion Purposes Only. First Nations' Task Force Submission on Claims. Revised December 11.

Assembly of First Nations. 1990. Migratory Birds Working Group. Ottawa. December 5.

Assembly of First Nations. 1990. *An Analysis of the Potential Impact of Recent Legal Decisions in Relation to Treaty and Aboriginal Rights in Canada*. Sioui, Sparrow, Simon, Horseman, and Flett. AFN Centre for Treaty Advocacy, Ottawa.

Assembly of First Nations. 1990. Message to the Government of Canada from the AFN Environment Committee. Ottawa, August.

Assembly of First Nations. 1990. Comments on a Wildlife Policy for Canada. Ottawa, March.

Assembly of First Nations. 1990. AFN Committee on the Environment, Conservation, and Sustainable Development. Vancouver, March 21-22.

Assembly of First Nations. 1990. Migratory Birds Working Group. Ottawa, January 26.

Assembly of First Nations. 1989. Discussions Regarding the Environment. March 31.

Assembly of First Nations. 1989. AFN Committee on the Environment, Conservation, and Sustainable Development. March 28-29.

Assembly of First Nations. 1988. Report on the Fur Development Program Proposal to Develop a National Database for Aboriginal Harvesters. December 5

Assembly of First Nations. 1988. AFN Committee on Indigenous Survival International and the Environment. September 14 - 15.

- Assembly of First Nations. 1988. Submission from the Assembly of First Nations to the Senate Committee on Bill C-30. Ottawa.
- Assembly of First Nations. 1983. Resource Rights, Ownership, and Jurisdiction: Draft Discussion Paper
- Assembly of First Nations. N.D. Statement of AFN Environment Committee: Preamble. Ottawa.
- Bastick, T. 1982. *How we think and Act*. Wiley and Sons. Toronto.
- Beanlands, G.E. and P.N. Duinker. 1983. *An Ecological Framework for Environmental Impact Assessment in Canada*. Institute for Resource and Environmental Studies. Dalhousie University. Halifax.
- Canadian Wildlife Service. 1989. *National Survey of Contaminants in Waterfowl: Native Harvest*. Environment Canada. National Wildlife Research Centre. Ottawa.
- Cole, D. and C. Bechard. 1991. *An Analysis: On Traditional Knowledge and the Environmental Impact Assessment Process*. AFN: Ottawa.
- Coon, T. 1981. *Cree Trappers Association Report 1980-1981*. Traditional Pursuits. Grand Council of the Cree (Quebec), Cree Regional Authority. Great Whale River, Quebec.
- Courtoreille, L. 1990. *Presentation to the Special Committee to Pre-study Bill C-78: An Act to Establish a Federal Environmental Assessment Process*. Ottawa, November 29.
- Federal Environmental Assessment and Review Office. 1988. *Environmental Assessment in Canada Today*. Ottawa.
- Federal Environmental Assessment and Review Office. 1987. *Reforming Federal Environmental Assessment*. Ottawa
- Fee-Yee Consulting Ltd. 1985. *A Downstream Perspective: Dene Concerns with the Environmental Assessment, Monitoring and Surveillance of the Norman Wells Project, with Particular Reference to Fish and Water Quality*. Fort Good Hope.
- First Nations Chiefs' Committee on Claims. 199 1. *Various memoranda on Claims Issues*. Toronto, January 30.
- First Nations Chiefs' Committee on Claims 1990. *Specific Claims Policy Review*. Toronto, January 30.
- Gasp Tax-bell Associates. 1991. *Sectoral Review of Sparrow Implications*. Kanasatake. January 22.
- Government of Canada. 1990. *A Report on the Green Plan Consultations: The Green Plan, A National Challenge*. Ottawa.
- Grand Council of the Crees. 1990. *Submission... to the Parliamentary Committee on Bill C-78*. Ottawa, November 29.
- Grand Council of the Crees. 1989. *Submission... to the Parliamentary Committee on Bill C-23*. Ottawa, November 1.
- House of Commons. 1990. Minutes of Proceedings and Evidence of the Special Committee to Pre-study Bill C-78: An Act to Establish a Federal Environmental Assessment Process. Second Session of the 34th Parliament. Issue No. 12. Ottawa, November 29.
- Hunting Rights Policy: N.D. *National and Regional Perspectives*. Source unknown.
- Indian and Northern Affairs Canada. 1989. A Memorandum to Assistant Deputy Minister, Donald K. Goodwin from Assistant Director, Environment Directorate, Douglas Kane. Report on Indian Environmental Issues. Ottawa, December 13-14.
- Inukshuk, R. 1991. *Report on Inuit Traditional Ecological Knowledge*. ICC: Ottawa.
- International Survival Indigenous. 1987. *A framework for a research policy for Indigenous Survival International, a discussion paper*. Prepared for ISI. April 22.
- James Bay Advisory Committee on the Environment. 1990. Bill C-78, an Act to Establish a Federal Environmental Assessment Process: A Brief Submitted to the Special Committee to Pre-study Bill C-78. Ottawa, November 20.
- Labillois, W. 1982. *Natural Resources and Native Rights in Canada*. National Indian Brotherhood. Ottawa, January 5.
- Manitoba Keewatinowi Okimakanak Inc. 1990. Draft Comments on the Green Plan Process for use by the AFN Environment Committee. Nelson House, September.
- Manitoba Keewatinowi Okimakanak Inc. 1990. First Nations Environmental Assessment and Review Process: A Project of the MKO-Natural Resources Secretariat. Nelson House, March.
- Manitoba Keewatinowi Okimakanak Inc. 1990. Interim Report to the AFN National Assembly. First Nations Environmental Assessment and Review Process.. Thompson, April.

Nakashima, D. J. 1990. *Inuit Biogeographical Information on the Hudson Bay Eider*. CEARC, Ottawa.

Onchiota Inc. 1985. The Anti-trapping/Animal Rights Movement and the Future of the Aboriginal Land-based Economy of Canada: Strategies to Support the Indigenous Peoples' Economy. July.

Saunders, J. N.D. The Sparrow Case. Two Briefing Notes.

Usher, P. 1987. Indigenous Systems and the Conservation of Wildlife in the Canadian North. In *Alternatives*, Vol 14.1. University of Waterloo.

Walpole Island Research Centre. 1984. The Struggle for Self-Sufficiency: A Panel Presentation Nin.da.waab.jig, Walpole Island.

Walpole Island Research Centre. 1986. *A Co-operative Study of Socio-Economic and Environmental Factors in Resource Management on the Walpole Island Indian Reserve*. Final Report. Nin.da.waab.jig. Walpole Island.

Wenzel, G.W.C. 1981. *Inuit Adaptation and Ecology: The Organization of Subsistence*. National Museum of Man, Mercury Series. Canadian Ethnology Service, Paper No. 77. Ottawa.

Wertman, P. 1982. *Implications of a Negotiated Autonomy: The James Bay and Northern Quebec Agreement and its Aftermath*. Cree Regional Authority, Val d'Or.

Winterhalder, B. 1991. Interdepartmental Seminar Series in Evolution and Systemic. Guelph University, April.

World Commission on Environment and Development. 1987. *Our Common Future*. (The Bruntland Commission Report). Oxford University Press.

World Conservation Strategy: N.D. *Indigenous Peoples and Resource Management*. Author unknown.

## 8. GUIDELINES FOR THE CONDUCT OF PARTICIPATORY COMMUNITY RESEARCH

### Dene Cultural Institute

Over the past two years, the Dene Cultural Institute has conducted participatory community research in three Dene communities on the subjects of traditional medicine, environmental knowledge and justice. These guidelines are drawn primarily from the experience of the traditional environmental knowledge pilot project, the purpose of which was to develop methods for documenting traditional environmental knowledge using a participatory community research approach. It is applicable to either a government or non-governmental agency planning to carry out cooperative research-within Canadian aboriginal communities. Because of the focus on our experience with Dene communities and the specific needs of our traditional environmental knowledge research project, some of the examples and recommendations may not be applicable to all aboriginal communities or projects. However, some of the guidelines may also be relevant to environmental, participatory community research projects being carried out in non-aboriginal resource dependent communities (e.g., fishing and agricultural communities in southern Canada). Suggestions and comments for the final document were provided by a number of groups and individuals involved in traditional knowledge research across Canada. A list of contributors appears in Appendix I.

#### ESTABLISHING COOPERATIVE RESEARCH VENTURES: THE DEVELOPMENT PROCESS

Once a problem of environmental assessment of management has been identified and/or initiated by a government or other outside agency, the chronological steps and guidelines for conducting participatory community research should be as follows.

#### **1. Identify the Partner Community and Establish a Cooperative Research Venture.**

The first step is to identify the partner community and by consultation develop a joint agreement to carry out the project within parameters acceptable to both the community and the outside agency. This may require several meetings with local government and the community at large, during which the objectives, proposed research methodology and expected results are thoroughly examined and explained in non-technical language. Prior to the signing of an agreement, the community should understand the commitments it would be expected to make, the benefit it could expect to receive and should have the opportunity to add to or to modify the objectives or plans of the research program before it is implemented. Although elected community representatives

are the signatories of the co-operative agreement, approval and support of the general community is essential to the project and should be obtained by consensus, if possible.

#### **2. Establish a Community Administrative Committee to Oversee the Direction and Operation of the Project.**

Once the project is approved, the outside agency should consult with the local authorities to establish a permanent administrative committee in the community to direct and oversee the operation of the project. The committee members should include representatives from the community identified by the local authorities and one representative from the outside agency. The latter would play only a supportive and advisory role to the committee and liaise between the community and the outside agency.

The responsibilities of the Community Administrative Committee should be as follows:

- (a) Define the duties and responsibilities of the community and the outside agency including the administration of funds, payment schedules, control of information, reporting and evaluation of project;
- (b) Define the work processes including the workplan, the research methodology and the training needs and develop an itemized total budget;
- (c) Define the duties and responsibilities of community and outside researchers, a Community Elders' Council and a Technical Advisory Committee, if required by the project;
- (d) Decide upon method of payment for local informants and community researchers;
- (e) Select community and outside researchers, Elders' Council and Technical Advisory personnel;
- (f) Arrange for office space and training facilities for project and housing for outside researchers, if necessary;
- (g) Monitor the progress of the project through regular meetings with the community and outside researchers and the Elders' Council; and

(h) Report project progress to the local government and to the outside agency on a regular basis.

### **3. Obtain Approval of Work Plan and Budget from the Outside Agency and Establish a Funding Agreement and Payment Schedule.**

Once the terms of reference for the project have been defined, the various committees formed, a work plan drawn up, the criteria for selecting local and outside researchers and a budget established, the community should seek final approval from the sponsoring outside agency. Upon approval, the funds should be deposited in an account in the community. A local person with experience should take responsibility for the project accounting. If there is no one available in the community to carry out this responsibility, training should be provided.

### **4. Establish an Elders Council of Experts on the Topic.**

Since most traditional ecological knowledge is provided by the older community members, it follows that an Elders' Council would be an important asset for a community research program. This advisory body could provide valuable assistance in the interpretation of language and data, suggestions for areas of research that are important to pursue and recommendations for the selection of community researchers. An Elders' Council would also help to restore the traditional role of elders as community teachers and advisors, respected for their knowledge and wisdom. The Community Administrative Committee in consultation with the local authorities and other knowledgeable community members should select the Elders' Council.

### **5. Select Community Researchers.**

The Community Administrative Committee in consultation with the Elders' Council should select the community researchers. One of the most important criteria in the selection of community researchers is their ability to speak fluently and write their Native language and English (or French in some cases). Without these skills, the work cannot be done effectively. The alternatives are to have an intensive language(s) training program for researchers, which may be too costly for individual projects or to have a qualified interpreter work with the community researchers for on-the-job training. Other important qualities are awareness of local traditional culture, previous research experience, interest and motivation.

Because hunting and trapping are traditionally a male domain in many resource dependent societies, in a very traditional community it may be difficult for a younger woman to establish her credibility and gain the confidence of some of the older men. However, this should not be an impediment to hiring women. On nearly all broad subjects of research, there

will be some perspectives and knowledge which is generally held by women and some which is generally held by men. A mixed research team presents the opportunity to discuss and deal directly with gender issues and will generally have the most adequate access to all perspectives. If gender is an issue in the interviewing of some older men and women, it may be advisable to let the researchers of the same sex work with these individuals. It must also be recognized that the rapport established between the interviewer and the interviewee depends on many social and interpersonal factors which are unrelated to gender (i.e., kinship and personality).

#### *5.1 Payment of the Community Researchers.*

Payment of Community Researchers should be decided upon by the Community Administrative Committee. For our Ft. Good Hope traditional knowledge project, community researchers were initially paid an hourly wage for their work as both interviewer and translator/transcriber. However, as the project progressed it became apparent that this arrangement was unfair to the fast, efficient worker. This type of researcher, with fluency in both English and North Slavey, often earned less money than someone who was less capable. Accordingly, the Dene Cultural Institute, in consultation with the local researchers decided that henceforth local researchers would be paid a fixed rate upon receipt of the transcript. This rate was calculated on the basis of the hourly wage times one hour of taped interview times the average amount of time it takes to translate/transcribe one hour of tape times the total number of hours for each tape.

#### *5.2 Work Schedule.*

For the Ft. Good Hope project, community researchers were employed on a part-time basis for the duration of the project. This was partly a function of insecure funding and partly the choice of the local researchers who wished to combine the research with other activities (e.g., homemaking, hunting, trapping). In retrospect, the Dene Cultural Institute felt that community researchers should either be employed on a full-time basis for the duration of the project or on a lengthy seasonal basis. This would allow them to devote maximum time and effort to the project. Research assistants with specialized talent (e.g., linguistics, photography, etc.), who were otherwise committed to other work (e.g., homemaking, wage employment, trapping), would be employed on a part-time or piece-work basis to augment the research project.

### **6. Select Outside Researchers.**

The Community Administrative Committee should select any outside researchers they feel would benefit the project. Their role should be one of offering advice and support to the community and to the local researchers. They should not be responsible for directing the research. Depending upon the nature of the project and the experience of the community

researchers, the outside researchers may be required to provide technical training in western science (e.g., the basic principles of ecology, environmental assessment and management) and methods of documentation (e.g., interviewing techniques, recording interviews, use of computers, report writing).

In addition to their academic qualifications, it would help if the outside researchers had some prior hands-on experience living with the culture they will be working with and be prepared to participate in community life as much as possible during their stay. Since they might also be responsible for delivering any required training, ideally they should have some teaching experience. Although both outside and local researchers bring their own cultural biases and personal interests to any project, the credibility of the outside researchers will be enhanced if they are not perceived by the community to be closely aligned with government or non-government agencies whose interests may be in conflict with those of the community. Outside researchers should remain in close contact with the local researchers throughout the project in order to provide them with guidance and feedback.

#### **7. Select a Technical Advisory Committee.**

Where possible, a pool of resource people should be available to provide advice and feedback to the research team. Such an advisory committee should consist of professionals who are not aligned with the outside agency and who have extensive experience working in the different areas covered in the research (e.g., a biologist, a social scientist, a linguist, persons with previous experience in participatory community research or community development). Such persons would be called upon to assist in the design of the research methodology and to provide help in the analysis and review of the final draft of the report.

#### **8. Begin Training Program.**

In most cases, community researchers would require some training in order to conduct the research. The type of training program provided to community researchers would naturally depend upon the type of project carried out, the individuals involved and the time and money available to run it.

If traditional ecological knowledge is being documented for the purposes of environmental assessment or management, community researchers should become familiar with the basic principles of western ecology and modern resource management. They should also be introduced to social science research methods (e.g., interview techniques, questionnaire design, sampling and analyzing qualitative data). Any traditional environmental knowledge research training program should provide a good balance of field and classroom activities. Ideally, all or at least part of this training should take place in a field camp setting and should include elders from

the community as instructors, as well as different scientists. This cross-cultural, interdisciplinary approach would permit local researchers to observe first hand the ecological topics under study, both from a western scientific and from an aboriginal perspective. At the same time, scientists would have the opportunity to learn about traditional knowledge. A field camp setting would also allow participants to concentrate on learning away from the distractions of everyday community life.

Depending upon the language fluency level(s) of community researchers, there might also be a need for intensive language instruction in the Native language and English or French. An important addition to any training program would be the inclusion of a component on basic linguistics to help both the local and outside researchers understand and learn how to cope with the complexities of translation.

#### **9. Select Informants.**

The Community Administrative Committee and/or the Elders' Council, in consultation with the local researchers, should select the informants. It is important to interview a wide range of informants to ensure that different perspectives are represented. The specific number of people to interview will depend upon informants' availability, the time frame of the project and the information collected. The researchers can assume that they have sampled the range of information available when they stop seeing significant differences in responses. While elders may be recognized as the most knowledgeable people to interview, there may also be many experienced middle-aged and younger hunters and trappers who would also be worth talking to. As well, it is important to interview women. They may not have participated to the same extent as men in all activities, but they are still very knowledgeable about them. They have heard the same stories and legends, which transmit traditional knowledge, as the men and have listened to discussions about these activities throughout their lifetime. Women may also have specialised information which men do not possess (e.g., berry picking areas). Often within a community, different individuals will be recognized as being particularly knowledgeable about certain geographical areas or particular species.

Payment of informants should be decided upon jointly by the Community Administrative Committee and the Elders' Council. Payment may either be in the form of gifts (e.g., groceries) or cash. For our project, informants were paid an hourly wage for each interview, with a maximum amount for a whole day spent out on the land.

### **DEVELOPING THE RESEARCH METHODOLOGY**

Traditional knowledge research is a new and rapidly

evolving field. There is no one correct method of data collection. Every project will have different objectives and limitations, hence the methodology will have to be modified to suit individual needs. The key to successful research is to remain flexible and innovative in your study and to be sensitive to the needs and lifestyle of the community you are serving. This section outlines the research methodology developed by the Dene Cultural Institute for the purposes of our own research project carried out in the Dene community of Ft. Good Hope, N.W.T.

## **10. Retrieval and Documentation of Traditional Ecological Knowledge.**

### **10.1 *Participant Observation versus the Ethnographic Interview.***

The ideal method to document and understand traditional knowledge is participant observation, whereby a local researcher and a biologist work together as a team to interview informants in as natural a setting as possible (e.g., while participating in hunting, fishing and trapping activities). The traditional activity, combined with the natural environment, provides a natural stimulus for discussion and learning for the scientist, the local researcher and the informant. However, few projects have the time or the financial resources available to use participant observation exclusively. For the Ft. Good Hope project, our primary method of data collection was the ethnographic interview, using a structured conversational approach supplemented by participant observation whenever possible.

#### *10.2 Structured versus Unstructured Interviewing.*

Assuming that community researchers are experienced or have received special training related to the project, the methods of questioning potential informants will vary among local researchers and informants. In some cases, the structured questionnaire, with its direct question and answer format, may be effective. In other instances, a more casual conversational approach may be most suitable. Some people require a lot of prodding to get them to talk. Others tend to wander off on subjects which may be irrelevant to the question; although, often, what appears to be irrelevant is in fact their way of answering the question (e.g., through a story or legend). A lot depends upon the skill of the interviewer to sense when it is important to probe for more information or gently steer the conversation back on track. The more knowledgeable the interviewer is about the subject matter being examined and the cultural way of expressing ideas, the more effective will be the interview.

In the pilot project at Ft. Good Hope, we found that the informal, 'conversational approach, with a list of questions used as a checklist or guide for the interviewer, gave the best results. Researchers were encouraged to allow the interview

to flow in as natural a way as possible and not to worry excessively about the order in which the information was collected or whether all of the topics were covered during one interview. Interviewers began by asking a general opening question (e.g., Can you tell me about beaver habitat in summer?). The idea was to give the informant the freedom to decide which subjects were important to talk about from his/her perspective and to present the information in a way that he/she felt was most appropriate. Along with the opening question, the interviewer had a list of probing questions to ask should the informant be unresponsive or wander off the topic. It is our opinion that this method would also be effective where the "participant observation" method of documentation is employed.

#### *10.3 Framing the Questions.*

A critical concern in the construction of questions for the purpose of environmental assessment or management is how to obtain data that answer questions which are important from a scientific perspective but are framed in a culturally appropriate manner. In our experience, we found that it was better to avoid the use of scientific terms in questions because they are often difficult to translate into the Native language. There are also scientific concepts which, when translated, elicit a negative or confused response because they are culturally inappropriate ways of asking for that type of information. For example, the modern concept of wildlife management suggests the control of a species by humans. The idea of humans controlling the environment is considered by the Ft. Good Hope Dene to be an interference with the natural order, which from their cultural perspective is not acceptable. Another example from our study would be asking trappers information about specific numbers of animals they have trapped. Some informants were hesitant about revealing this type of information for fear that it might be used against them by the government. For others, talking about the numbers of animals they had trapped was considered to be boasting. In both of these cases, the fact that local researchers played a major role in designing the questions and carrying out the interviews meant that these problem areas could be more easily identified and resolved.

Informants were also reticent when asked about conditions in areas where they had little or no personal experience. In such cases, the local researchers found that when inquiring about marten habitat, for example, it helped to ask the informant to describe the physical characteristics of his own trapping area.

#### *10.4 Group, Pair and Individual Interviews.*

Depending upon the objective of the interview either group, pair or individual interviews may be used. Individual interviews allow the more reserved person to speak freely. On the other hand, some people may feel uncertain about the knowledge they have and be more at ease discussing their



ideas in a group situation. In our experience, unless the interviewer was very skilled at facilitating a group discussion, either everyone broke off into smaller discussion groups or one or two persons dominated the interview. Although we did not try it, group interviews are probably most useful when trying to reach a consensus about a particular subject where there appears to be a wide range of opinion among respondents. Pair interviews are good because one person may help to jog the other person's memory about a particular event or clarify a point. Often, a husband and wife make a good team in this respect.

#### *IO.5 Recording the Interview.*

Wherever possible, all interviews should be recorded on tape. However, permission to tape record must be given by the informant prior to the interview. Tape recording an interview allows the interviewer to concentrate on the questioning and encourage the informant by expressing interest and other culturally appropriate responses. However, not everyone may agree to be tape recorded, in which case it may be better to have two people participate in the interview, one person to ask the questions and the other to take notes. Even if the interview is being tape recorded, it is always a good idea for the interviewer to take a few notes in order to clarify certain points at the end of the interview.

Where applicable, data such as specific habitats, migration routes, calving areas, fish spawning areas and other information relevant to environmental assessment and management should be recorded on maps of appropriate scale. Having a map of the area present during the interview may also help stimulate an informant to talk about a particular geographical area or species.

### **11. Conducting the Interview.**

#### *II.1 Setting of Interview.*

Community researchers should conduct interviews where the informant is most comfortable. Although interviews on the land are preferable, this may not always be possible with elders, especially in winter. In this case, a quiet, private place in the informant's home or other comfortable surroundings should be utilised.

#### *11.2 Preliminary Interview.*

Interviews should be preceded by a brief, informal discussion with the informant wherein the purpose of the interview and the type of information sought are briefly discussed and the time and location of the formal interview arranged. If a general policy regarding the control and use of the project data has not been established by the Community Administrative Committee, informants should be informed of their right to decide how the information from their interviews

should be used. All informants should be required to sign a release form at the beginning of each interview about a particular subject. The release form should indicate who should have access to the information beyond the use of the specific project (i.e., the general public, only community members) and what the time frame should be (e.g., immediately, in ten years or when the person is deceased).

#### *11.3 Conducting the Interview.*

The most important step in conducting an interview is to put the informant at ease. Our local researchers found that often the best approach was to begin the interview by having tea with the informant. During the interview, the interviewer should avoid asking leading questions and citing the names of persons who have provided contradictory opinions. The interviewer must make an effort to show interest in the conversation through eye contact and other responses. They should be sensitive to an informant's fatigue and, if this becomes apparent, arrange to stop the interview and continue at another time. Most interviews should not last more than two hours.

### **12. Transcription and Translation of Interviews.**

Transcribing and translating tapes is a very time consuming process. Community researchers should transcribe the tapes verbatim into the aboriginal language as soon as the interview is completed. This way the information is still fresh in their minds and if there are any problems of interpretation the researcher can easily return to clarify points with the informant. It also prevents the build up of a back-log of untranscribed tapes. If the interviews are to be translated into English or French, community and outside researchers should work together to translate at least one interview of each subject early on in the interviewing to ensure that any problems of translation are resolved before the work gets too far along. It is important to fully understand the aboriginal terms and concepts to ensure that the meaning is not lost or distorted in the translation.

Once the transcriptions and translations of interviews are completed, community researchers should go over their contents with informants to ensure correct interpretation. If there are major differences in responses among informants about a particular subject, a meeting of the Elders' Council should be held to discuss the issue.

### **13. Analysis, Organization and Management of Data.**

It is difficult to recommend a particular method of data analysis and management because each project will have specific objectives and methods of documentation. From the experience of our Ft. Good Hope project, we can offer a few suggestions for analyzing and managing data that should have general application to other traditional ecological knowledge

research.

Traditional ecological knowledge information for use by government administrators and the scientific community usually requires a certain amount of re-interpretation into technical/scientific language to make it more meaningful and useful to these outside users. It is, therefore, advisable for the outside researcher to review the verbatim English or French transcripts and to reinterpret and re-write the data in appropriate language.

The data is then analyzed and evaluated for completeness and relevance to the research objectives. Wherever possible, environmental assessment information should be extracted from the transcripts and transferred to base maps upon which transparent overlays of land use proposals may be superimposed. The base map would reveal information gaps and the overlays will identify potential conflicts between a development project and the environment. In any event, the base map(s) are often more meaningful than the written report.

Most traditional knowledge information is presented in anecdotal form and is, therefore, difficult to classify and analyze. Often, people will discuss several different subjects in answer to one question. Because the information is often difficult to separate without taking it out of context, it is necessary to develop some system of cross-referencing for data classification. At the time of writing this document, no computerized system of data management was in use for the Ft. Good Hope project.

The objectives of our pilot project were to try to answer questions about the nature of Dene traditional knowledge, including Dene perceptions of the principles of ecology and the sustainable use of natural resources. To analyze our data, we first classified all of the information according to different subjects. Then the information was summarized in

non-technical English. Eventually, a computerized data management system could be developed to handle both the anecdotal and the summarized information.

### 13. Dissemination of Information.

Throughout the duration of the project, the Community Administrative Committee, the sponsoring agency and the community as a whole should be kept informed of its progress and of any major problems that arise. For the Community Administrative Committee and the sponsoring agency, brief oral and written reports, supplemented by mapped and other graphic data forms, should usually suffice. Similar information may be presented to the community by talking about the project regularly on the local radio and/or by holding an open house so the community can drop by the project office to talk with local and outside researchers. It is important to take slides and photographs for displays and public presentations.

Progress reports and a summary of the final report should be translated into the aboriginal language and distributed widely as a community newsletter. Depending upon the nature of the project, and the availability of funds, it might also be useful to produce a video of the work. This would be useful for public education, for school curriculum and for professional presentations. In the preparation of the final report, each of the participating groups should have input into its design and content before it is finalized (i.e., the Community Administrative Committee, the Elders' Council, the Technical Advisory Committee and the local and outside researchers). A draft final report should be distributed to other communities, agencies and individuals for comment. Once the report is finalized, a community meeting should be held to present the final results of the project. Copies of the final report should be sent to the community, the sponsoring agency and appropriate others for future reference.

---

## APPENDIX I. LIST OF CONTRIBUTORS TO GUIDELINES DOCUMENT

Harry Bombay  
Executive Director  
National Aboriginal Forestry Association  
29 Conover St.  
Nepean, Ontario K2G 4C3

Harvey Feit  
Department of Anthropology  
McMaster University  
1280 Main Street. W.  
Hamilton, Ontario L8S 4L9

Evelyn Pinkerton  
School of Community and Regional Planning  
University of British Columbia  
Rm. 433, 6333 Memorial Rd.  
Vancouver, B.C. V6T 1W5

Peter Pool  
Environmental and Renewable  
Resources Consultant  
R.R. 1, Alcove, Quebec, JOX 1A0

Robert Ruttan  
Biological Consultant (Biologist,  
Cultural Institute Traditional  
Environmental Knowledge Pilot Project)  
R.R. 1, Vimy, Alberta TOG 2G0

Joan Ryan  
DeneAnthropologist (Principle Investigator  
Dene Cultural Arctic Institute  
Traditional Justice Project)

Arctic Institute of North America  
The University of Calgary  
2500 University Drive N. W.  
Calgary, Alberta T2N1N4

Ms. Victoria Smith  
Community Researcher  
Ehattesah Tribe  
910 Island Highway, Box 7 16  
Campbell River, B.C. V9W 6J3