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Reflections on Local Knowledge and Wildlife Resource Management: Differences, Dominance and Decentralization

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Introduction[1]

In this paper I argue: a) that it is important to examine the differences between the uses of local knowledge in wildlife management as compared to its uses in economic botany and health professions; b) that the application of local knowledge by wildlife resource professionals is decisively shaped by the interests and conditions of state institutions; c) that the processes and structures linking state systems and local peoples are little influenced by the needs and well-being of local resource users; d) that we may nevertheless be at a historical moment in which this long-standing pattern is under increasing stress, as a result of global restructuring and government funding cuts, and in which the opportunities and benefits for change are significant for state and regional institutions, local users, and wildlife.

A number of researchers have documented in detail how local knowledge has been systematically used by local resource users, and communities of resource users, to enhance sustainable resource use. Such research has also demonstrated how local knowledge has contributed to resource management regimes of the state (see, for example, Akimichi, 1981; Cordell, 1984; Cox and Elmqvist, 1991; Freeman, Matsuda and Ruddle, 1991; Johannes, 1978, 1980,1981, 1989; M. Johnson, 1992; Langdon, 1989a; Lewis, 1982; Marks, 1976, 1984; McCay, 1980; Pernetta and Hill, 1984; Posey and Balee, 1989; Usher, 1986; Williams and Hunn, 1982; and references cited below on northern Canada and on common property resources). There are a growing number of examples which also show how local knowledge is being recognized and used by wildlife resource managers who actively seek to collaborate with local experts and institutions in their work (see, for example, Alberta Society of Professional Biologists, 1986; Baines, 1985; Breton, Smith and Kemp, 1984; Davis, 1988; Drolet, Reed, Breton and Berkes,

1987; Nakashima, 1990; Pinkerton, 1989; Traditional Knowledge Working Group (NWT, Canada), 1991; and, Northwest Territories Government, 1994). New and developing practices are emerging, and these do enhance local inputs and influence within specific local or regional management arrangements.

Nevertheless, I would argue that at the level of wildlife resource management as a profession and a discipline, and at the national institutional level, the recognition and use of local knowledge in wildlife management is still decisively shaped by professional and bureaucratic interests as opposed to local practices and needs. This is so despite both local pressures and a developing public acknowledgment of the value of local knowledge, and a resulting rapid growth in political recognition of its significance. The impacts of these changes are more restricted at a professional level (among the readings on Canada are: Brynaert, 1983; Freeman, 1989b; Macpherson, 1986; Richardson, Sherman and Gismondi, 1993; Theberge, 1981; and Sterling, 1990). This is also indicated, for example, by the absence of discussions about using local knowledge among the regular session topics and papers offered at major annual professional wildlife management meetings.

In those cases over the last two decades where new institutional links have been established between local peoples and state regimes, especially in co-management institutions, there has been great progress and greater hopes. We are just now beginning to get detailed assessments of the development of these processes from the perspective of their potential for systematic use of local knowledge and practices. So my conclusions are subject to revision, as additional data becomes available.

This paper offers an initial assessment of how local and non-local conditions shape acknowledgment and use of local knowledge, and the institutional structures for their use. Patterns in wildlife management are examined in relation to variations between developments in different professions, and over time.

First I look at uses of local knowledge in several different professions where local knowledge has played a significant and recognized role in the work of non-local institutions of applied science and management: in economic botany, development agriculture, pharmacology and health care professions in order to compare how different uses of local knowledge have been facilitated, hindered and developed.

Second, I look at state-mandated wildlife management regimes in order to explore the conditions which have made them both responsive and resistant to the contributions of local expertise and users. In this process, I explore how they are embedded in history and society. This raises social and political questions about how practices of recognition occur in contexts of power, dominance and resistance.

Then I turn briefly to some of the current issues facing wildlife management regimes in a period of government retrenchment and cutbacks in funding. Here I suggest that a century old pattern of interests and constraint may be changing, and I explore some of the resources and strategies that might be mobilized at this time in response to these changing conditions. In this discussion I explore potentials for sustained recognition of local knowledge, and for systematic decision-

making involving local resource users, in the context of current transformations of wildlife management practices.

Several questions about the uses of indigenous knowledge by non-local institutions inform my text: How does the extra-local use of local expertise serve different participants' goals? Which agents have the most effective control of its use, and how? What are the relationships between state-mandated and market institutions and local systems, experts and actors? Can the use of local knowledge be enhanced or constrained by developments and problems faced by resource management regimes today?[2]

Insights from the Use of Local Knowledge in Economic Botany, Development Agriculture, and Pharmacology

Over the last two decades it has been demonstrated that local knowledge while different from Western scientific knowledge, is nevertheless systematic, based on observation and analysis, very extensive, imminently practical, and relevant to the management of resources.[3] Three of the most widely recognized uses of local knowledge by corporations and applied scientific organizations are in the areas of the use of indigenous biological resources in the commercial agriculture industries and agricultural development, and the use of local resources by pharmacology.

Recognition of local knowledge, particularly that involving local breeding of plants has a long history in economic botany. Eighteenth and nineteenth century European expeditions often included experts who specialized in making collections. The major botanical gardens of the colonial and post-colonial periods were not just collections of curiosities for the emerging classes in Europe; they served as important centers for research and for developing applications of exotic biological resources, gathered from around the world, for overseas European plantations as well as for European agriculture (Crosby, 1986). Indeed, recent work by historians such as Richard Grove indicate that the origins of environmentalism by Europeans had their roots in European colonies, and that local knowledge and practices played key roles in the development of early environmentalism among Europeans (Grove, 1995).

With modern corporate agriculture this has grown into a major area of investment, and into a widely organized search for new biologicals. Commercial uses were typically the result of simple extraction of biologicals from their local contexts, and their transplantation to other sites. The biologicals were uprooted from their social and economic contexts without further connection to the peoples and places of origin. However, scientists and corporate investors have raised questions recently about the conservation, sustainability and viability of transplanted biologicals.

Stephen Brush, notes in a recent review of the use of indigenous knowledge in economic agriculture and pharmacology, that:

“Industrial countries who use biological resources from less developed countries rely on indigenous knowledge in three ways. First, biological resources such as diverse crop populations have been screened, selected, and maintained by hundreds of generations of farmers and plant

gatherers, and they reflect the distilled experience of thousands of individual selections. Second, local knowledge systems of indigenous farmers are used directly in the collection of biological resources, since plant collectors from industrial countries often rely on indigenous informants and guides in their search for useful plants. Third, industrial countries depend on indigenous knowledge for the conservation of biological resources. On-site (in situ) conservation involving the active participation of local people with intimate knowledge of biodiversity is essential for several reasons" (Brush, 1993: 660).[4]

Thus "[o]n-site conservation is now accepted as part of the long-term solution to conserving the store of biodiversity . . ." (Brush, 1993: 660).

Agricultural development experts have reached similar if more socially oriented conclusions. For example, it has been shown in some African communities that a number of varieties of seeds for particular crops are maintained and reproduced by households, usually the women farmers, and they are used on different sites or exposures. The variety within the seed pool and the crop varieties help assure greater chances of returns when severe conditions occur.[5] Development experts have concluded that local resources are therefore key to the long-term sustainability and improvement of household based agriculture (for discussions of these and related themes see: Brokensha, Warren and Werner, 1980; Cox and Elmqvist, 1991; Davis, 1988; Hanks, 1984; International Development Research Centre, 1993; Redclift, 1984; Richards, 1985; Warren, Brokensha and Slikkerveer; and, 1993 Williams and Baines, 1993). But this type of work, which draws on and benefits local populations, is only a modest portion of the overall usage of local biologicals and knowledge.

The market value of indigenous knowledge and plants is virtually impossible to calculate, but it is very significant in monetary terms. For example, indigenous seeds are responsible for a significant proportion of the value of the genetic improvements in seeds on U.S. market, which have an estimated value of $600 million annually (Brush, 1993: 660-1).[6]

The uses of local knowledge in pharmacology receive regular publicity, and estimates of the value of local knowledge to the world market in pharmaceuticals and medicines run as high as $43 billion annually (see Brush, 1993). Whatever the values, the stakes are high, involving large companies seeking substantial financial advantages from their access to local biological knowledge.

In pharmacology, probably more than in any other domain, there is acceptance of the view that local knowledge warrants considerable attention and effort, and is imminently useful. Here, recognition extends increasingly beyond the realm of experts and entrepreneurs to the wider public. Accounts of ethnobotanical research for locally known medicines are found in popular articles (Time Magazine cover story Sept. 23, 1991), in mass-circulation books (e.g. Plotkin, 1993, "Tales of a Shaman's Apprentice," and Davis, 1996, "One River: Explorations and Discoveries in the Amazon Rain Forest"), in extensive television and radio documentaries (for a published example see Arom, et al, 1993), and even in fictionalized commercial films (eg. "Shaman," with Sean Connery).

However, the very recognition and wealth that are involved in the use of local biologicals by institutions from the industrialized world bring out the complexities and problems inherent in an extractive process. One problem is that pharmacological and economic botanical uses of locally known biologicals are in some respects the most restricted uses of indigenous knowledge. In these cases local knowledge and biologicals are used by and for outsiders, and they are incorporated into the systems of knowledge and use of industrial companies with a minimum of contact between the two peoples.

Even if local knowledge is acknowledged and used, it is not primarily local knowledge that is sought but the products of that knowledge. There is usually no ongoing systematic relationship established, although the emerging concerns for retaining biological diversity of the biologicals are a source of change. The fact that there is no adequate compensation (Brush, 1993) is symptomatic of the exploitation which is involved. Even in pharmacology, relatively little attention is typically paid to the ways the biologic is used by local healing experts.[7]

Health Care Institutions and Local Healers and Traditions

Probably the most rapidly changing example of the uses of local knowledge has been the result of growing recognition within bio-medical institutions that delivery of medical care is very much shaped by patients' expectations about what constitutes well-being and illness, and what constitutes appropriate and complete care. Where patients are from different communities or sub-cultures, their use of bio-medical treatment facilities is often significantly shaped or restricted by the failure of health care institutions to recognize and respond to the patients' cultural expectations and values. Within urbanized industrialized nations, it has been found that many individuals from non-dominant cultures, including minority and immigrant groups, and indigenous peoples, use the health care system at much lower rates than would be expected, and less effectively and intensively (for references to both medical traditions and recent developments see: Adelson, 1998; Doyal, 1979; Dubos, 1959; Freidson, 1970; Inglis, 1964; Kleinman, 1980,1988; Kaufert, J. et al, 1985; Kaufert, P. and O'Neill, 1990; Lindenbaum and Lock, 1993; Lock and Gordon, 1988; Navarro, 1979; O'Neill, et al, 1993; Speck, 1987; Zborowski, 1969; and Zola, 1973).

Local culturally appropriate practices of health care have survived alongside Western medicine throughout the developed world as well as in the third world. These services are used not just by distinctive communities or by the elderly. As the variety of Chinese medical practices demonstrate, diverse health care institutions and practices have continued in industrialized urban areas for well over a century. Some healing traditions have been expanded or introduced in recent decades as both sub-cultural choices and as alternative health care options for broad sectors of the wider public. The presence of these alternatives, albeit limited, has a significant impact on bio-medical health services.

Bio-medical practitioners have responded to the discovery that significant sectors of their intended clientele do not fully use their services, and that many mix the use of bio-medicine with various services based on culturally appropriate or alternative healing. As a result their programmes are beginning to adapt bio-medical services and institutions to the cultural choices of patients, in some cases adapting their practices to other healing traditions.

Some bio-medical staff and institutions recognize not only that patients require culturally different care, but that there are alternative local expert healers.[8] This has led to some innovative explorations of ways to make both systems available to patients within the institutionalized structures of a health care system. In a few cases the local healers work within hospitals and treatment centers, where a patient could choose treatment from either or both. In other cases a system of referrals has been established.

These exploratory practices go beyond interpreting the bio-medical system more effectively to patients and increasing their involvement. At the level of doctor - patient interaction a new tolerance for patient choices outside the services of standard health care organizations is now commonly found. Practitioners explicitly recognize that bio-medical systems might be adapted to patient needs and desires.

Only in rare cases do bio-medical practitioners explore possibilities for recognizing and implicitly or explicitly giving standing to parallel systems of healing from other cultures. When they do recognize the systemic organization of local knowledge, the bio-medical approach usually tries to fit it within its own structures. It tries to identify a small group of local experts who can be recognized on the model of bio-medical practitioners - as exclusively mandated experts. Broadly based local knowledge and responsibilities for community-wide health are not sought, nor is it assumed that most people will have some expertise, as is often the case in culturally traditional communities. Furthermore, the usual practice ignores the community-wide embeddedness of many systems of local knowledge and practice. It does not examine, for example, cultural systems in which people define health and well being as living in a healthy community.

These explorations have also not come without considerable resistance from within bio-medical fraternities, and therefore they are not commonplace. Resistance from within medical institutions and among practitioners is widespread, but because there is a growing awareness that medical care requires practitioner-patient partnerships, and that patients have rights, there are changes occurring.

To review, health care, pharmacology, economic botany, and development agriculture give some recognition to local knowledge, while each has made important use of this expertise. The reasons for their uses and recognition flow from a range of concerns, including: economic motivations; a desire to more fully achieve the goals of service institutions; and humanitarian concerns and ethical codes. On one hand pharmaceutical companies and seed producers seek possibilities for profit, and they establish limited contact or recognition of local contributions and expertise while they extract the products of local knowledge.

Development staffs and medical practitioners are not solely profit oriented, but systematically depend on funding from government agencies, foundations and private sources that they legitimate with effective client service. This focus on clients is complemented by the development of pluralizing services. The changes are not driven exclusively by funding priorities but also by assertions of clients' rights as both ethical principles and increasingly common legal claims.

In addition, many practitioners and institutions in these latter fields are motivated by desires to benefit people, through increased crop yields, or harvest reliability, or improved health care. Here the benefits apply to local populations and involve some reciprocity with holders of local knowledge. These motivations create more continuing and developing relationships between non-local institutions and the populations they serve, albeit that systemic relationships between national or regional institutions and local systems of both social development and health are just now developing.

Despite some notable changes, the processes linking local knowledge holders in all of these fields is still dominated by non-local institutions and their agendas, practices, values, needs, justifications, and limits. A somewhat parallel, but not identical, picture exists with respect to the use of local knowledge to manage wildlife resources.

Wildlife Resource Management Regimes and Local Knowledge - Issues

The most widespread motivation for recognizing local knowledge in wildlife resource management is that compliance of local resource users with the management plans devised by state wildlife regimes is enhanced if local users can be convinced to cooperate.[9] As local resource users become better informed about state institutions and policies they have become more critical of regulations in which they have had no input. As people become more assertive of their rights, overt legal challenges to regulations and policies are more commonplace.

The unacknowledged and worrisome shadow over wildlife management regimes is noncompliance, of which poaching is but the most visible portion. Poaching and noncompliance, sometimes as explicit resistance, sometimes as the continuation of local "traditions," are the gray economies of wildlife management, and they create a constant awareness of the need for the cooperation of resource users.

Efforts to increase local cooperation have largely involved local resource users as "consultants" in management decisions. Such consultations involve commenting on plans already developed for achieving goals previously established by state-mandated experts. This has helped to get local inputs, and is a step forward. In practice it has often gone beyond its intended goal and made managers more aware of and responsive to local needs and views.

But these processes have not generally resulted in changes to the planning processes whereby local experts or local users/managers are involved in goal setting and in planning from the beginning and on a comparable footing with state-mandated managers. Nor have they generally incorporated alternative management strategies based on local practices into state management planning. Neither have institutionalized ways by which significant local knowledge about resources can be incorporated into the existing planning and management processes been developed. Nor have systematic relations between local and state management systems been effectively established for whole jurisdictions and across all resources being managed.

This is somewhat surprising, because there is a practical need for such knowledge in wildlife management. An increasing body of research by both resource management specialists and

specialists in local knowledge systems has shown that existing state-mandated management practices frequently operate with insufficient knowledge. It has also been demonstrated that local knowledge systems are a valuable source for some of that knowledge (e.g. Gibson and Marks, 1995; Marks, 1984, 1995; McEvoy, 1986; Freeman, 1989a, 1989b, 1992; Langdon, 1989b; Nakashima, 1990; Nakashima and Roué, in press; Wenzel, 1991; and, Berkes, 1995).

Furthermore, wildlife management is increasingly understood as a process of recurrent testing and approximation to goals, rather than a formal scientific application of adequate knowledge to closed systems objectives, an approach called adaptive management (Holling, 1978, 1986, 1994; Berkes, 1995). Therefore there would be little practical loss, and there is much to gain, from including local knowledge in a process of approximation and testing of means to achieve management goals.

A recalcitrance to change in wildlife resource management exists although there are significant counter-pressures. To understand these forces I examine the contexts of wildlife management.

Comparative and Historical Perspectives on Wildlife Management

Part of the reason for the limited use of local knowledge in wildlife management is tied to features that differentiate resource management from both economic botany and pharmacology, and from health care and agricultural development. Wildlife management is like health care and agricultural development and unlike economic botany and pharmacology in that the primary motivation for seeking connections to local peoples is not economic. Therefore the links between local and national actors are not modeled on contractual relationships, and are not focused on commodities extracted for sale in the market place.[10] Like agricultural development and health professions, wildlife managers have a continuing and multi-stranded relationship to the people who use wildlife, although this relationship has not always been acknowledged and it is often not formalized.

Unlike health practice which must draw a clientele to its institutions and which recognizes the right of the patient to a voice in provision of services, state wildlife management legitimates itself by reference to its service to animal welfare, and the role which human needs and goals should play in decision-making is unclear and often ignored. This is enhanced by the historical development of wildlife management with an orientation toward the natural sciences, and a frequently restricted analysis of the social issues involved.

In wildlife management the primary client group is seen to be the mute animals themselves and resource users are cast as self-interested exploiters in need of regulation, rather than as persons with primary well being and ethical rights at stake in wildlife management.[11]

The legitimating myth of wildlife management, as expressed in many of the textbooks and review articles I have examined, is that wildlife management as science and as practice has developed to serve the interests of wildlife, although authors acknowledge the needs of people are linked. A corollary, implicit in much of the discussion, is that resource users do not and cannot consider the interests of the exploited wildlife, and therefore a specialized and disinterested agency is needed. This is provided by a combination of state ownership or control,

and professional management by a unit of the state apparatus, using a specialized discipline for training. The myth overly values scientific knowledge and state-mandated wildlife management, while under-valuing local knowledge and resource user management practices (for a range of views and omissions, see: Anderson, 1985; Bailey, 1984; Churchman, 1984a, 1984b; Dasmann, 1964; Giles, 1978; Holling, 1978; Leopold, 1933; Livingston, 1981; McNab, 1983; Mulvihill, 1988; Peek, 1986; Pelletier, et al, 1984; Pinchot, 1910, 1947; Robinson and Bolen, 1984; Romesburg, 1981; and Scheffer, 1976).

The recognition that there often are incentives for resource users to over-exploit resources, should not exclude consideration of other human - wildlife relationships, including both the dependence of some populations on wildlife, and the frequent active stewardship of wildlife where they are used by resident local communities.

Unlike both health care and agricultural development which involve a mix of state, collective and private interests, authority over wildlife resource regimes is claimed to be the sole responsibility and right of the state. This is exercised through management by applied scientific experts. Biologists who are managers of wildlife must be employed by state institutions, and are also legitimated by the state.

A related feature is the complex political nature of wildlife resource decision-making. Decisions are typically the outcome of politics involving conflicting government policies for economic development and wildlife management, inter-departmental competition, complex and usually incomplete scientific evaluations, and lobbying by public users' groups, environmentalist organizations, and others, many claiming to speak for wildlife themselves. This politics rarely has a clear or public form, and the majority takes place behind the scenes (so the frequent dominance of bureaucratic and/or economic interests remains obscure). Thus there is a considerable disincentive to make wildlife management decision-making in truly public arenas where all groups affected by decisions would have effective opportunities to participate.

A frequent consequence is to perceive local management practices and systems as being without legitimacy or utility. Thus recognition of local knowledge and management is often perceived as involving a reduction in the exclusive authority, effective power, or decision-making efficiency of state-mandated managers. While this is true in health institutions as well, it is moderated by the ethical and practical responsibilities that those institutions recognize toward patients.

Developing research in environmental history has given us one way of examining concretely the relationship between wildlife science, state management regimes, globalizing economies, and local resource users/managers (for example: Hays, 1969; Worster, 1977; Marks, 1984; McCandless, 1985; McEvoy, 1986; Anderson and Grove, eds., 1987; Grove, 1995; Bramwell, 1989; Guille-Escuret, 1989). Historical research on the development of the conservation movement in North America has shown how Progressive Conservationism developed into government policy at the turn of the century as part of a process whereby land, water, range, forests, wildlife (including fisheries) came under the effective control of the governments, many of them for the first time. These processes reduced local rights and control by small-scale users in favor of government control.

Government control was legitimated not merely in the interests of the resource, but in the national interest - a social and political goal. In an increasingly competitive world economy which was at a decisive developmental stage at the turn of the century, North American governments redefined natural resources as national resources, to be conserved and managed so that they could be used more efficiently and comprehensively to develop the national economy. The adoption of the new government policy and institutions were informed by the "gospel of efficiency," although legitimated as conservation of resources (Hayes, 1969).

The practical consequence of government centralization of resources, and of a quest for efficient use, was the allocation of resources to large corporate users. Many forests, range lands, fisheries, water and mineral resources on government lands were made available to large corporations for use, rather than to small-scale local and regional developers. Wildlife resources, other than fisheries, were probably the least severely affected by these corporate trends, as the scale of outfitting remained restricted, and access and hunting by the general public were restricted and controlled, but not eliminated.

Nevertheless, in the process, the dominance of corporate use was felt as wildlife needs and uses were clearly subordinated to those of forestry, mineral and water development, and large scale need for rangelands. The resource management disciplines developed along with the government instituted departments responsible for regulation of access to specific resources. Forestry, fisheries biology, wildlife management, range and soil management, and water management disciplines all developed or expanded as distinct scholarly and applied disciplines, within universities, early in this century as trained researchers and managers were needed by new and expanding government agencies. As disciplines, they frequently legitimated themselves by their utility to the national economy, as well as to the resources. Research on the methods adopted in these disciplines indicates that the choice of management strategies consistently required continuing specialist intervention,[12] and thus sustained a continuing demand for professionals and for bureaucracies (Worster, 1977).

Historical research thus shows that state-mandated wildlife management is very much a social activity serving needs and interests of specific groups, and not simply those of wildlife or of society in general. At times its practitioners have not always been fully cognizant of whose needs they have served.

This social complexity is reflected in the epistemological development of the discipline. The enduring series of debates within wildlife management over the meaning and primacy of conservation, protection, preservation, maximum yield, sustained use, resiliency, etc., reveal that epistemologically the goals for action do not flow directly from the encounter with wildlife, or simply from abstract conceptual developments in science, but from social and historical ideas about what is best for wildlife and for some specific groups of people. These ideas are themselves historically located. Protectionism became the dominant view as the last of the vast open lands of America were explored and settled and resources came to be seen as limited. Progressive conservationism coincided with the rise of American economic power and the emergence of modern corporations. Maximum yield came to prominence during the period of American dominance of the globalizing economy and technology. Sustained use arose during

the period when a revitalized environmental movement created a public awareness that environmental issues and development were often in conflict.

That state wildlife management is exclusively a government and professional management is therefore closely tied to management models and the lack of acknowledgment of the full range of social groups who use and depend on wildlife resources. Therefore, the appropriate questions are: whose vision of the needs of wildlife and people will shape wildlife policy and practice? Which groups will benefit in the process and which will suffer?

The Missing Local Actors

Failing to see the historical and social matrix of wildlife management probably explains the failure of most wildlife management literature to consider that wildlife resources are related to the health and well being of humans in direct and indirect ways. It has been increasingly recognized in recent years that contact with natural environments and wildlife is a valued and vital experience for many urban people. Wildlife managers have also recognized that the public appreciation of wildlife, and the economic value of wildlife resources and associated industries, need to be emphasized to enhance the weight given to wildlife issues within wider planning processes. But it has been striking that unlike pharmacology, agricultural development or health sciences, wildlife managers have only recently and infrequently legitimated their activities by their contribution to human health and well being, as well as that of the wildlife resources.

Rarely mentioned are the growing voices of rural and indigenous resource users many of whom have called attention to the direct connection between the condition of wildlife and the condition of their communities and individuals. Many indigenous subsistence hunters and many small-scale commercial fishermen often live in communities and families whose health and well being are closely linked to the wildlife, including fishery resources. They depend on wildlife both for cash incomes and productive lives, and wildlife subsistence is often key to their nutrition, health and well being. Because these communities often will not relocate, and because their commitments to place, people and lifestyle preclude general adoption of urbanized alternatives, their well being and health are profoundly shaped by their use of and ties to wildlife resources. This has been found repeatedly in recent decades following the decline of inshore fisheries.

But the link to health and well being also exists for some urban and agricultural workers and communities. If you travel the third world, the second world, or parts of poor rural or urban America, marginal laborers around urban settings and rural farm laborers and peasants often depend on local fish and small game resources to supplement their diets and provide more adequate nutrition for growing families. Fishing from highway bridges, and snaring or hunting from highway shoulders you will often find poor people, men and women, seeking to maintain and improve the health and well-being of their families which depend on a harvest of fish and wild meat. The pattern can be seen in Rio de Janiero and Novosibersk, as well as in suburban Miami and northern Quebec. As the major transformations of industrialized nations create more marginal employment and more marginalized people, the numbers of families dependent on wildlife for vital protein and nutrients are likely to grow.

These are connections often ignored by wildlife scientists and managers. One reason these links are ignored is the extent to which wildlife management is dependent upon governments and professionals. The peoples most affected have a limited voice in government, and their needs have not often been heard. Furthermore, to recognize that some wildlife management decisions affect the health and well-being of human populations would raise questions about recognizing a right of those affected populations to have a say in the decisions.

Wildlife management policy is typically an amalgam of the interaction of various claims on wildlife: the current scientific view of proper goals, the institutional and bureaucratic interests of managers and agencies with government careers, the economic lobbying of the outfitting and tourism/recreation industry, the political leverage of the large urban-based sports hunters and environmentalist organizations, and the demands and limits imposed by other more powerful government departments or interests concerned with the development of minerals, forests and water resources. Historically the concerns that tend to be excluded, even though they may be the groups most significantly affected, are those of the local users and managers who cannot mobilize effective leverage and who have not been accorded institutionalized representation or resources to organize.

Consider how these resource policies contrast with economic botany and pharmacology where local knowledge is recognized as facilitating the achievement of goals by providing access to valuable resources. Wildlife management also contrasts with bio-medicine and agricultural development, where patient health and rights intervene between professionals and practice. In wildlife management local users are generally excluded, or they are seen as being invited to limited consultation, they are not systematically seen as either holders of a valuable resource nor as clients with claims to well being.

Prospects and Choices in an Age of Declining Government Resources

This embeddedness of wildlife management in the wider society, and specifically its dependence on the state, have immediate implications for the future of wildlife management in a period of government retrenchment. Current cutbacks in government funding, and therefore services and bureaucracy, mean that wildlife managers are facing a reversal of the governmental growth that characterized this century. This may therefore be an opportunity to explore some new directions as century-old relations are being changed by globalizing conditions as well as local pressures.

On one hand, it is likely that enforcement efforts will be cut back as governmental resources dwindle.[13] This is already well underway, under the banner of de-regulation, wildlife and environment agencies have been disproportionately cutback in many jurisdictions. This may encourage new explorations of means for more effective cooperation and voluntary compliance among all resource users and managers. The question is whether state wildlife managers will facilitate and play a role in this process, or retrench and retreat as funding declines take hold and as resources are put under increasing pressure by new under-regulated developments.

In the last decade social science research has shown that many resource users are in fact involved individually and collectively in consideration of the interests of exploited wildlife, as well as in

fulfilling their own needs. The tragedy of the commons is not a universal outcome. Widespread common property regimes have been described where users have long-term interests in sustaining resource uses. These have developed rich and effective local community or user-group mechanisms for restraining use and sustaining resources in the face of that use, while remaining independent of state systems (for example, McCay and Acheson, eds., 1987; Pinkerton, ed. 1989; Berkes, ed., 1989; Berkes, et al, 1989; Feeny, et al, 1990). Common property resource regimes make sense where people's long-term well being in local settings is at risk, and they bode well for the potential success of new wildlife management ventures with enhanced community direction.

It is also likely that with reduced funds, capacities for state dominated research will decline. As a result it may be clearer that state managers will be short of vital data, and that involving local knowledge expertise more extensively and more effectively will be cost efficient and will enhance the knowledge base for management decisions. In addition, research would benefit if it drew more upon local research agendas and traditional skills.

Furthermore, it may be opportune for all resource managers to acknowledge that subsistence uses of wildlife mean that the resources are vital to human and community well-being, and that a health and nutritional evaluation of wildlife resources may not just be a marginal side-light to standard considerations but a valuable broader issue which can enhance the internal political weight of wildlife management decisions in government policy-making and in public arenas. It is also, as indicated above, an issue that implies acknowledging wider responsibilities and creating wider decision making practices.

Turning to local knowledge, research shows that it is embedded in the everyday social systems and practices of groups and communities. It is part of local specialists' everyday lives, and it can only continue to develop as part of peoples' social lives. It therefore follows that the best way to mobilize that knowledge as well as practice is through processes of joint management in which voluntary restraint and traditional forms of local management of resources are more extensively recognized by state-mandated wildlife management. National wildlife management institutions can only effectively link to local human needs for well being by involving local people and peoples in ongoing systemic processes. The aim must not become to extract tidbits, but to link individuals, groups, communities and local institutionalized practices in culturally appropriate and empowered decision-making processes that operate both locally and nationally.

In summary, state-mandated wildlife management faces one of those historical moments when the conditions that gave rise to it are changing, both within the structure of the nation state and at the local level. The consequences of how it responds will have broad implications for its future. Recognizing the plurality of wildlife management systems, and the plurality of means to joint management, could simultaneously reinforce and link the effectiveness of both state-mandated and local management at a time when changes threaten state administration, local management, and many resources.

NOTES

[1] Earlier versions of this paper were given at the EuroMAB V Conference on "Managing Common Resources in the North: Divergent Interests in a Changing World," Kangerlussuaq, Greenland, September 4-8, 1995; at the Laval University conference on "Le savoir environnemental autochtone dans le Nord: Définitions et Dimensions - Aboriginal Environmental Knowledge in the North: Definitions and Dimensions," at Forêt Montmorency, Québec, September 18-21, 1997; and at the 7th Conference of the International Association for the Study of Common Property, Vancouver, British Columbia, June 10-14, 1998. The author wishes to acknowledge the constructive comments that were received on earlier versions from: Michael Bravo, Gary Kofinas, Stuart Marks, Colin Scott, Frank Sejersen, and Joe Spaeder. Research on which the paper is based was made possible by research grants from the Social Sciences and Humanities Research Council (410-96-0946, and 410-93-0505), and from the Arts Research Board of McMaster University.

[2] I undertake these reflections, as a social scientist, not as a researcher trained in wildlife management. I have drawn on over twenty years of involvement with wildlife researchers and state managers and regimes, on a wide reading of the wildlife management literature, and also on considerable research with local knowledge experts, and local users and managers among James Bay Cree of Quebec. The generality of my findings and reflections need further consideration, and I would welcome comments from readers about these issues.

[3] The significant extent, structured nature, and practical utility of local knowledge can therefore be taken as a starting point for other questions (for example see research on the north of Canada by Berkes, Feit, Freeman, M. Johnson, and Nakashima; and see recent reviews by Berkes, *et al* [1989], Berkes [1993], Brush [1993], Colorado [1988], Davis [1988], Feeny, *et al* [1990], Freeman [1992], Gadgil and Berkes [1991], Ingold [1994], Johnson [1992], Mailhot [1993], and Pinkerton [1989]). Even so, a tremendous amount of research is still needed to learn more about what types of local knowledge there are, how they are embedded in culture and power, and how they differ from and may be similar to scientific and other western forms of knowledge.

[4] The reasons he cites for the latter are that no botanical garden or seed bank can be the repository of the total biological diversity present in the region of origin. Collections isolate the biological resources from the evolutionary processes that created them - both hybridization with wild and weedy relatives and natural and human selection, which continue to generate new resources. The artificial conditions of collections can also create their own problems for some biologicals.

[5] Often it has been found that some of these varieties are more resistant to both disease and drought than are varieties developed in industrialized nations for commercial mechanized agriculture.

[6] This value of improvements includes the germ plasm resources from indigenous farmers and that from the scientific infrastructure.

[7] The focus is on finding what the biologic is used for by local experts, not on how they are used. For example, many local practitioners use medicinal plants in complex combinations with others.

[8] One form this takes is the use of culturally appropriate health care interpreters to act as intermediaries between the western health care specialists and the patients. But this has often not had fully satisfying results, because it has been hard to meet patients' own expectations that western health care will acknowledge and meet their diverse socio-medical needs.

[9] In most cases a full-scale policing effort among uncooperative users cannot be sustained because of the number of people and the area of the territory involved. While enforcement by setting examples of punishing a few law-breakers has worked in the past to a considerable degree, its effectiveness is almost always subject to change and resistance.

[10] The wildlife institutions of the state may however be interested in extracting cash or commodities through licensing fees or taxes.

[11] The actual relationships of scientists, policy makers politicians and users are in practice quite different from this ideal model, as Finlayson's (1994) sociology of knowledge of the collapse of Atlantic cod stocks shows.

[12] For example, protection of forests was seen to require increasing management and fire control. Establishing parks and game preserves were often interpreted to require predator control, restriction of local user access as well as tourist access, and both required policing. Existing or potential methods of local management were not recognized or utilized.

[13] It may also give resource users who perceive themselves to be excluded more leverage when they turn to non-cooperation with policing.

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