



Wilderness in the Circumpolar North: Searching for Compatibility in Ecological, Traditional, and Ecotourism Values

2001 May 15–16; Anchorage, Alaska



Abstract

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There are growing pressures on undeveloped (wild) places in the Circumpolar North. Among them are pressures for economic development, oil and gas exploration and extraction, development of geothermal energy resources, development of heavy industry close to energy sources, and lack of appreciation for “other” orientations toward wilderness resources by interested parties from broad geographical origins. An international seminar in Anchorage, Alaska, in May of 2001, was the first step in providing basic input to an analysis of the primary set of values associated with Circumpolar North wilderness and the constraints and contributors (factors of influence) that either limit or facilitate receipt of those values to various segments of society.

Keywords: biodiversity, tourism, wilderness, conflict, collaboration, culture, traditional ecological knowledge

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Cover art by Neal Christensen (Polar bear and Inuit woman photographs by Hinrich Baesemann, www.polarfoto.de).

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Sponsors



USDA Forest Service, International Programs; Rocky Mountain Research Station



Aldo Leopold Wilderness Research Institute



USDI Bureau of Land Management, Alaska State Office



U.S. National Park Service, Alaska Region



National Science Foundation, Office of Polar Programs



U.S. Fish and Wildlife Service, Alaska Region



University of Alaska, Anchorage



University of Montana, Wilderness Institute

Preface

What began in the late 19th and early 20th centuries in the United States to save some areas of the cultural and natural landscape as “wilderness” has spread to a worldwide movement. There are many ways wilderness character is protected today, including setting aside private holdings; state, provincial, and national legislation; local land management agency policies; collaborative, comanagement initiatives among tribal and other government interests; and nongovernmental organization actions. The international community interested in the issues surrounding protecting wildlands as wilderness is united through the *International Journal of Wilderness* (in its seventh year of publication) and the World Wilderness Congress, which has met seven times since 1977, in different locations around the world. Through these media for interaction, we learn about the different sets of values ascribed to wilderness in different cultures and the evolving set of influences (both positive and negative) on protection of these wilderness values.

At the 5th World Wilderness Congress, in Tromsø, Norway, in 1993, Rothenberg (1995) concluded that the only thing agreed upon within the international group in attendance was to disagree on the meanings of wilderness. A definition that mostly focuses on the physical aspects of wilderness has been developed by the World Conservation Union (IUCN): Large areas of unmodified or slightly modified land and/or sea, retaining its natural character and influence, which is protected and managed to preserve its natural condition. The stated objectives are broad, extending from (1) future generation enjoyment of areas that are relatively undisturbed by humans to (2) maintaining natural attributes and qualities, (3) providing appropriate public access for physical and spiritual well-being of visitors, and (4) enabling indigenous communities to continue living at low density, and in balance with available resources.

While the above definition aims at extension across cultures, there is a need to be more specific in our understanding of the values, constraints, and contributors to wilderness protection in many regions of the world. The purpose of the group of papers presented in these proceedings is to provide a focus on wilderness in the Circumpolar North. Invited speakers contributed to this compilation of information to try to understand the current and anticipated priority research and education issues surrounding wilderness protection in the Circumpolar North. This introduction is intended to identify sponsors and participating organizations, and to clarify the purpose of individual contributions.

Sponsors

The University of Alaska, Anchorage, hosted this gathering of scientists, managers, planners, educators, students, and representatives of nongovernmental organizations and the general public. Although the seminar and a followup workshop was organized by Lilian Alessa of the University

of Alaska, Anchorage, and Alan Watson of the Aldo Leopold Wilderness Research Institute, the meeting also represented a long-term commitment of the University of Montana's Wilderness Institute to supporting meetings that bring people together to establish the current state-of-knowledge on currently important wilderness topics. The University of Montana Wilderness Institute's (Dr. Wayne Freimund, Director) financial contribution to support travel of some participants to this seminar and Dr. Michael Patterson's active participation and attendance is gratefully acknowledged.

A proposal to the National Science Foundation's Office of Polar Programs to support travel and facilities for this meeting was awarded to the University of Alaska, Anchorage. This financial support and continuous encouragement and review of ideas by Dr. Fae Korsmo is gratefully acknowledged.

Dr. Val Mezainis of the USDA Forest Service's Office of International Programs has shown continued interest and support of efforts to share information across countries where the wilderness concept is taking root. Financial support of this international seminar from the Office of International Programs is another indication of the strong commitment of that office to building international cooperation to address protected area issues.

Mr. Gary Edwards of the U.S. Fish and Wildlife Service, Alaska Regional Office, was also a positive influence on the ability of the University of Alaska, Anchorage to host the international guests for this seminar. A financial contribution to help bring the wilderness science and management community in the Circumpolar North together and a commitment by Mr. Roger Kaye to help with organizational conceptualization is sincerely appreciated.

We also thank Mr. Neal Christensen for developing the seminar logo, which was used for posters during the seminar and appears on the cover of this proceedings. Liisa Morrison provided invaluable assistance in preparing for the initial reception of international guests and assuring their visit to Alaska was a good one.

Publication and distribution of these proceedings is sponsored by the Aldo Leopold Wilderness Research Institute, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station; the Alaska Region of the National Park Service; and the Alaska State Office of the Bureau of Land Management.

Participating Organizations

A seminar was planned that would bring together, for the first time, many of the scientists working in Arctic countries toward an understanding of an array of sometimes conflicting values of wilderness. Through presentations from invited key representatives of the Arctic Centre of the University of Lapland, the University of Tromsø, the Danish Forest and Landscape Research Institute, the Northern Lands Research Institute of the University of Northern British Columbia,

the Environmental Research Institute and the University of Iceland, the University of Alaska at Anchorage and Fairbanks, Alaska Pacific University, the University of Montana, the Alaska Department of Community and Economic Development, Friends of the Siberian Forest, Komarov Botanical Institute, the Northwest Territories Protected Areas and Dene Nation, the USDA Forest Service Rocky Mountain Research Station, and the Aldo Leopold Wilderness Research Institute, the latest information on trends in demands for wilderness uses and threats posed to important human and ecological values were summarized.

Purpose of Individual Contributions

Originally offered by Watson and Landres (1999) and expanded by Watson (2001) (fig. 1), a general model of evolution of wilderness values was adopted as a framework to guide invitation of papers and presenters for the seminar and resulting publication. In this model, there is acknowledgment that values associated with wilderness do evolve, and some of the influences on this evolution process are identified.

General Societal Trends and Specific Influences on Wilderness Values

A presentation by Ginny Faye of the Alaska Department of Community and Economic Development was on the evident trends in tourism to Alaska and the anticipated impacts of these trends to local economies (paper not submitted for inclusion in this proceedings). Alaska does not appear to be a “top 10” ecotourism destination, despite its wealth of wilderness and wild lands, because of limitations posed by remoteness from population centers, the cost of travel, and the relatively undeveloped tourism product there. As the State works to correct these deficiencies, the resulting trends associated with travel to Alaska will have long-term influences on the values associated with wilderness. Berit Kaae of the

Danish Forest and Landscape Research Institute provided an indepth look at tourism trends and resulting research priorities in Greenland. Roger Kaye, of the Arctic National Wildlife Refuge has studied some of the specific influences on wilderness values in the arctic, such as changes in technology, changes in public expectations and demands on wilderness lands, and the evolution of management actions and low-impact techniques of visitors (paper not submitted for inclusion in this proceedings). Paul Ongtooguk of the University of Alaska, Anchorage, provided a native perspective of the trends associated with places protected as wilderness in Alaska (paper not submitted for inclusion in this proceedings). This perspective extends to well before the arrival of the nonnative pioneer and explorer and addresses the role of “evolving traditions” in changing attitudes toward wilderness policies.

Values (Attitudes Toward Wilderness)

While this seminar concentrated on the more objective type of values (human and ecological meanings and services), Angela Stadel, Raymond Taniton, and Heidi Heder of Canada’s Northwest Territories provided an excellent introduction of how local community values, or attitudes, associated with wild places can contribute to decisions associated with which wild places to protect. Bob Pfister of the University of Northern British Columbia also housed the argument for more collaborative models of management within the need for greater acknowledgement of local native community values associated with both wild places and traditional measures of national and provincial governments to protect those places.

Legislation, Policy, and Wilderness Protection

Andrei Laletin, of the Friends of the Siberian Forest in Russia, explained the history of Russian policy to protect the strict nature preserves there. The history in Russia is quite

Wilderness Values and Valuation

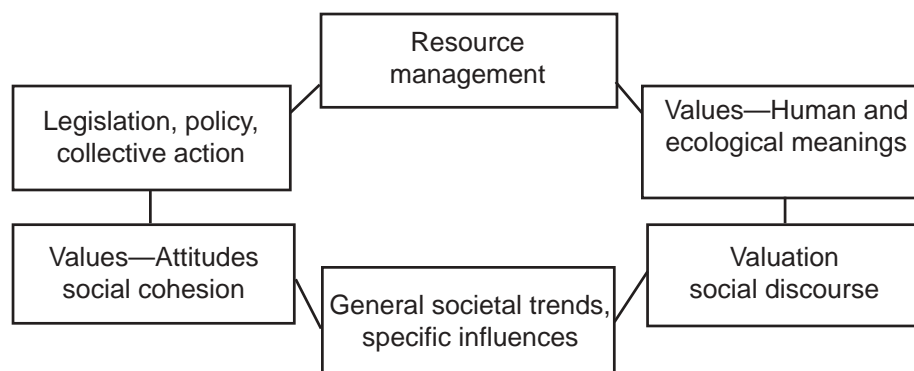


Figure 1—A general model of evolution of wilderness values (adapted from Watson and Landres 1999).

different from recent efforts in Canada to protect wild places (presented by Bob Pfister, Angela Stadel, Raymond Taniton, and Heidi Heder), and is in turn very different from the history of the United States and Finland, the other polar north countries with national legislative protection of wilderness lands and water.

Values (Human and Ecological Meanings and Services)

Since the seminar series was mostly focused on trying to understand the compatibility between traditional values associated with nature, growing ecotourism values associated with wilderness protection, and the need for ecological protection of fragile arctic ecosystems, the bulk of the presentations, and thus the papers published here, concentrated on articulation of the outcomes associated with interaction with the wilderness resource and the associated factors of influence (the things that promote or threaten realization of those values). Papers by Joar Vittersø of Norway, Greg Brown of Alaska, Dave Klein of Alaska, Anna-Liisa Sippola of Finland, Henry Huntington of Alaska, Herb Anungazuk of Alaska, Björn Gunnarsson of Iceland, and ThóraEllen Thórhallsdóttir of Iceland gave a broad forum for discussion of how arctic people (and visitors to the arctic) value the wild places they find there.

Valuation Decisions (Social Discourse on Value Conflict and Compatibility)

The process of weighing the different values associated with wilderness, or making management decisions that will influence the outcomes realized by different groups that place value on wilderness protection, is a complex one. Jim Gladden of the University of Alaska, Fairbanks, described the origins of political conflict surrounding arctic wilderness, and Dan Williams of the USDA Forest Service, Rocky Mountain Research Station delved into the social, not the psychological, construction of wilderness, in an effort to explore the effects of place meanings, value pluralism, and globalization on wilderness protection decisions. Mike Patterson of the University of Montana emphasized the importance of using appropriate research methodologies to fully understand the different, sometimes conflicting, values associated with a place in order to fully consider each social orientation toward the place and activities engaged in during the valuation process (paper not submitted for inclusion in this proceedings). In the final analysis, these valuation processes greatly influence evolving societal trends and specific actions taken that will influence the attitudes future generations will develop toward the wild places of the Circumpolar North.

Process

The papers compiled here comprised the 2-day seminar. The seminar was basically a listening session, intended to provide a base for discussion after the participants had a firm understanding of the trends, attitudes, legislation and policy, human and ecological values, and valuation process associated with wilderness in the Circumpolar North. Following

the listening session, a 1-day workshop occurred with four primary working groups striving to bring answers to the following questions to a larger, closing general session of participants:

1. Identification of high priority, cross-discipline, Circumpolar North wilderness research issues.
2. Identification of ways to (a) broaden the identification and assessment of Circumpolar North wilderness values research to reflect the unique elements of arctic and subarctic ecosystems and cultures, and (b) improve the methods for valuation and/or comparison among these diverse values in ways that are sensitive to diverse cultural standards and methods for making such valuations.
3. Identification of efficient, effective methods of conveying existing and future knowledge regarding the compatibility between human uses and ecological protection values of wilderness to managers, academia, and society.
4. Identification of priorities and methods of development of a Wilderness Working Group to provide infrastructure to continue in pursuit of bringing the priorities identified in the other groups to reality.

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Perspectives on Wilderness in the Arctic

David R. Klein

The ability to see the cultural value of wilderness boils down, in the last analysis, to a question of intellectual humility.

Aldo Leopold, 1949

Abstract—In the American lexicon, the concept of wilderness has become formalized through the Wilderness Act of 1964, and thus it has been defined in legal terms as a land designation. Yet wilderness, just as beauty, remains in the eye of the beholder, and how individuals experience wilderness varies both within cultures, as well as between cultures. As pressures for resource extraction, tourism, and related commercial development spread northward into the Arctic, those living in the more intensively developed lower latitudes may perceive the Arctic as a last remaining portion of the Earth, where it is still possible to set aside large areas of land as wilderness. Indigenous peoples living in the Arctic, however, view the lands and waters that have sustained them and their cultures as their homelands. People living outside the Arctic may seek to protect Arctic areas as wilderness for the benefit of future generations who share their values. If the “wildness” of arctic lands is to be protected from destructive human pressures, it must be done within the context of the cultural perspectives of arctic-dwelling peoples.

Wilderness as a Concept

The concept of wilderness dwells in the mind's eye. Therefore, unlike physical and biological components of the real environment, wilderness is not an entity of the land. We humans perceive land as wilderness based on those characteristics of the land that we associate with wilderness, stemming from our individual perspectives of wilderness. The concept of wilderness, however, like all products of human perspective, is unique to each individual. A commonality may exist in the perspectives that each of us holds toward the natural world as a result of similarity in our cultural origins, life experiences, and the physical and biological characteristics of the portions of the world to which we have been exposed.

Since wilderness as a concept, like other human concepts, exists in the mind rather than in the land, it is not an absolute entity or value, and is subject to change with time as cultures change and experiences broaden. In North America, the wilderness concept had its origin largely from the perspective of wildness that European settlers, familiar with human-dominated landscapes, brought with them to the New World. This view of wilderness was melded by experiences the early immigrants gained during their subsequent settling into the new lands and through their opening and ultimate “taming of the Western Frontier.” Understandably, the wilderness concept changed markedly from the perception of wilderness shared by most European colonists upon their arrival in North America, to the view of wilderness held today by most Americans and Canadians, the majority of whom have become urban dwellers. In our hindsight, change and the passage of time appear nearly synonymous, whether one's focus is the physical, biological, or human cultural aspects of the world, yet acknowledgement of the pervasiveness of change in our past seems lost when foresight is called for.

In the United States, the evolving concept of wilderness attained prominence in the American lexicon through the efforts of those who pioneered the emerging environmental philosophy and its advocacy of nature appreciation, such as Henry Thoreau, John Muir, and later, Aldo Leopold. Although Leopold played a dominant role in the development of an environmental philosophy within which wilderness and its values have become entrenched in Western thought, he underwent a personal evolution in his own thinking during his lifetime that both shaped and mirrored changes in the way society has come to view the environment (Flander 1974; Nash 1982).

Leopold's contribution to the emerging environmental philosophy and the associated wilderness movement, however, distinguishes itself from the writings of other

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advocates for the environment through its primary foundation in science (Callicott 1987). Although Leopold's valuation of wilderness was based on an ecological understanding of nature and, therefore, was scientifically based, he also emphasized the aesthetic and historical-cultural bases for the appreciation of wilderness (Leopold 1953). For example, he stressed the importance of retaining traditional means of access into wilderness areas and of seeking primitive experiences within them (fig. 1). Leopold also strongly felt that the wilderness experience should include freedom to hear the sounds of nature without the competing sounds of mechanization, and it should take place in an environment largely free from dependence on technological society.

The wilderness concept reached its philosophical and political apex in American society with passage by the United States Congress of the Wilderness Act in 1964. Since its passage, the Wilderness Act has been the mechanism that has assured protection of extensive areas of public lands in the United States for their perceived wilderness values, protecting them for both present and future generations from the continuing pressures for development generated by an industrialized society. Although formalization of the definition of wilderness within the Wilderness Act has constrained evolution of the wilderness concept within American society, societal perspectives and concepts, nevertheless, remain subject to change as our culture evolves.

Effects of Globalization on Indigenous Culture in the Arctic

The accelerating rate of cultural change in the United States drives, and is driven by, cultural changes at the global level. The so-called globalization of world society is viewed by many, perhaps justifiably, as a means for exportation of the less desirable materialistic aspects and values of American society. Yet it has another face, deriving largely from the high rate of immigration that includes reciprocal influences from other world cultures on the dynamic evolution of American culture. From an arctic perspective, the balance of flow of cultural influences has been largely into the Arctic from the numerically and technologically dominant cultures to the south.

An accelerated push to explore and map new frontiers, associated with the search for new resources to exploit, characterized the Western world during the latter half of the past millennium. This drive for new lands and waters to claim and exploit ultimately reached into the Arctic, stimulated by advances in maritime navigation in the 15th and 16th centuries, discovery of the New World, and the era of empire building by major European nations. It reached a frenzied peak in the 18th and 19th centuries. The early polar explorers, driven by the spirit of adventure, as well as by



Figure 1—Modes of travel in wilderness areas have cultural roots (dog sleds, left), and their acceptance is based on past patterns of access. Seeking a balance between accepted primitive or historical modes of travel in wilderness areas and modern mechanized transport, exemplified by the contrast between horse and aircraft transport, right, presents a challenge for wilderness managers in today's world.

nationalistic pride and competition to lay claim to new lands for their countries, began the process of Western cultural dominance in the Arctic by assigning names to the geographical features they encountered there. The traditional place names used by the indigenous peoples of the Arctic within their homelands, who were without their own written languages and published maps, were ignored by arctic explorers who preferred to see themselves as pioneers in a hostile land unknown to the “civilized world.” Peoples of the Arctic, considered at the time to be in a primitive stage of development without prior conversion to Christianity, were viewed as outside of the dominant Western culture and, therefore, without entitlement or authority over the lands that they occupied. This view of arctic peoples prevailed during the era of empire expansion by European countries bordering the Arctic as they “discovered” and laid claim to all existing lands in the Arctic, with little consideration for the peoples that resided in them.

National policies and practices regarding indigenous peoples living in the Arctic have varied widely between countries and over time, including mutually beneficial trade, exploitation of the people and the resources they depended on, forceful subjugation, religious and cultural conversion, and benevolent paternalism. In all of these historic scenarios, however, lands in the Arctic were viewed as the national endowments of the countries that laid claim to them. These were “new lands” to be explored, mapped, and their features named consistent with the cultural language of the countries with dominion over them.

Recent accelerated globalization of the world economy has brought with it pressures for the melding of world cultures; the flow of these pressures being largely from developed industrialized societies, seeking to exploit new sources of resources and to expand markets for their consumer products, to the so-called undeveloped societies of the world. Unfortunately, this globalization of culture does not derive from intercultural understanding and an appreciation for the values inherent to individual cultures. The Arctic has been largely ignored in the past by industry in its search for needed resources because of its remoteness and extreme climate that have tended to make costs of resource development prohibitive. However, the availability of new technologies has increased the feasibility and lowered the costs of resource development in the Arctic, resulting in a new focus on the Arctic as a source of resources to serve the expanding demands of industry (fig. 2).

Following the collapse of commercial whaling in arctic waters by the end of the 19th century, most Arctic cultures remained peripheral to the primary influences of industrialized society until the Second World War, when the strategic military importance of the Arctic was recognized. Changes experienced by the peoples of the



Figure 2—Remote areas of the Arctic have now become targeted for energy and other mineral extraction, resulting in loss of values for sustainable harvest of wildlife by arctic residents, as well as for wilderness recreation. On the left, oil is being burned off in a well flow test during development of the Prudhoe Bay oil field, and on the right is the 1,000-km oil pipeline that bisects the Alaskan Arctic as it carries Prudhoe Bay oil to southern markets.

Arctic on the cultural, social, and economic fronts, amplified during the Second World War, have continued to accelerate as renewed pressures for resource extraction have expanded into the Arctic, along with the granting of increased political autonomy to indigenous peoples of the Arctic.

Striving for a Balance Between Sustaining Subsistence Resources and Wilderness Values While Allowing Extractive Industries

Undeveloped lands and waters of the Arctic continue to be valued by the peoples of the Arctic for their sustainable productivity for traditional harvest of subsistence resources. With increased autonomy over their homelands, Arctic peoples are also being encouraged, through prospects for monetary benefits and employment opportunities, to offer these lands for resource extraction to serve world industrial interests. Others who live outside of the Arctic see wilderness values in these lands. Uses of arctic lands for traditional subsistence purposes and wilderness recreation can be compatible, while serving both the interests of cultures indigenous to the Arctic and those from outside of the Arctic. Similarly, extractive resource development generated by pressures from outside the Arctic can serve the interests of arctic communities by providing increased economic self sufficiency, a source of funding for social services, and employment incomes needed by arctic residents to afford their increasingly Westernized life styles. A balance is needed, however, between protection of lands in the Arctic for their sustainable production of the subsistence resources on which peoples of the Arctic depend and identify with culturally, and dedication of lands for resource extraction and associated development that provides for their monetary economic needs.

Achieving an equitable balance between divergent and sometimes competing uses of lands in the Arctic presents major challenges for arctic residents, their regional governments, and the countries that have sovereignty over arctic lands. Providing for designated long-term uses of lands in the Arctic cannot be done without an understanding of their values and importance to residents of the Arctic, as well as those living outside of the Arctic. Whether lands are to be maintained, on the one hand for their productivity for subsistence and sport harvest of fish and wildlife resources, as well as for wilderness recreation, or on the other hand for extraction of nonrenewable resources such as oil, gas, and minerals, their effective management is only possible if an understanding exists of how these human activities may affect the unique ecosystem relationships and processes on these lands. Such an understanding must include an appreciation for the role of humans, both in the past and potentially the future, within these arctic ecosystems.

Indigenous peoples of the Arctic, through their subsistence harvests in the past, have been functional components at the top trophic level of arctic ecosystems, along with other predators such as the wolf and grizzly bear, and they presumably will continue to do so in the future (fig. 3). Humans in the past have also had a less direct effect on arctic systems through their activities, although usually with a light touch, by trampling vegetation and the soils as they camped and traveled over the land. These effects of human presence within arctic ecosystems can be viewed as natural if humans are considered components of these systems, just as trails in the landscape left by migrating caribou are natural. We humans, however, assign values to our actions in relation to their consequences; thus, we view our effects on the natural environment in terms of their possible effects on the productivity or aesthetic beauty of the land and waters to which we assign human values.

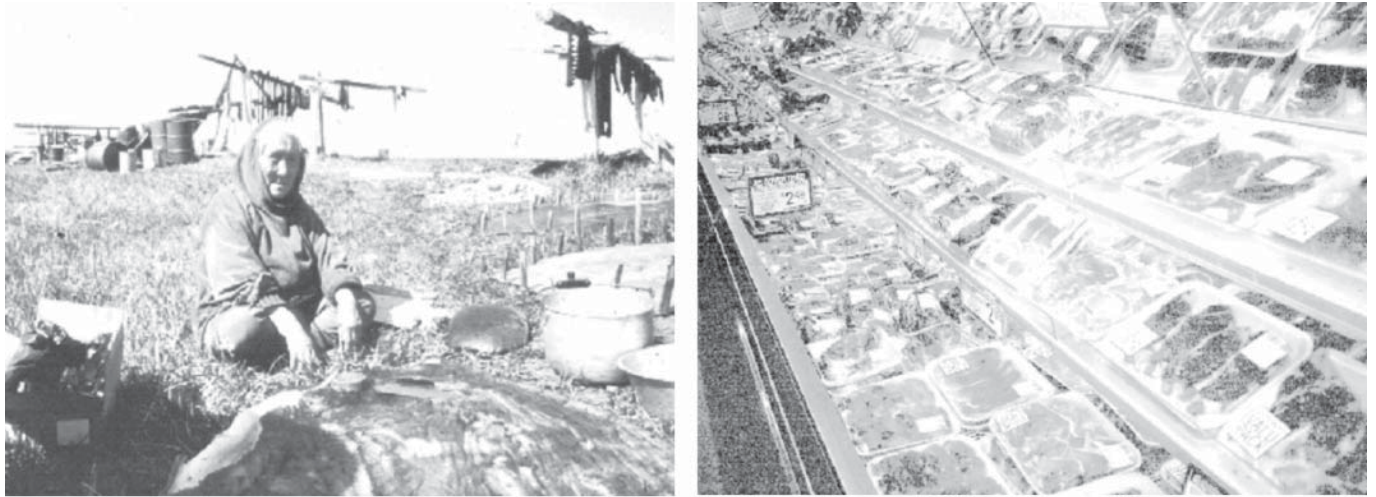


Figure 3—For many arctic residents, wilderness areas in their homelands are analogs of the supermarkets where most urban dwellers obtain their food. On the left, a Yupik Eskimo woman is processing subsistence food; on the right is a packaged meat counter in an urban supermarket. When people become removed from the sources of the food they consume, they lack interest in its origin and appreciation of the relative environmental costs of its production.

Conclusions

It should be evident that if we humans, whether as subsistence resource users, sport hunters, or wilderness seekers, wish to sustain the integrity, productivity, and unique wilderness qualities of arctic lands that we value, we must view ourselves as components of these arctic ecosystems and understand our role within them, thus justifying our presence within them but limiting the degree of our impact on them. Aldo Leopold (1949), in his essay *The Land Ethic*, stressed the importance of recognition of the ecological connection to the land that humans share with other organisms, when he wrote, “A land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it.”

The task for those who are charged with managing human use of lands in the Arctic for the sustainability of their productivity and continuity of uses, in appreciation of the values we have ascribed to them, is not simple (fig. 4). Arctic ecosystems, although often comprised of fewer plant and animal species than ecosystems at lower latitudes, nevertheless share in the complexity that is common to all ecosystems. An understanding of the complexity that underlies ecosystem function in the Arctic is far less advanced than is the case for ecosystems in more temperate regions to the south that have long been the focus of ecological investigations. It is clearly evident that effective management of human use of lands in the Arctic requires greater understanding of arctic systems than exists today. The need for increased focus of research on the dynamics of arctic ecosystems is particularly apparent, as pressures on arctic lands increase by residents of the Arctic who want to continue to use arctic resources as they have in the past, as well as from those who live outside of the Arctic but seek to develop and exploit its resources, or travel there to experience its remote wilderness values.

We do not need to abandon the Wilderness Act to protect the “wild” lands of the Arctic. Its legislation has served us well in the protection of, as yet “untrammelled,” lands within our own temperate landscapes, and it should continue to do so. But in the Arctic, where humans continue to live in their homelands as integral components of the natural systems present there, new terminology is needed for designation of protected areas if Arctic residents are to be supportive players in the selection and protection of lands we “southerners” view as wilderness.



Figure 4—Aldo Leopold (1949), writing in the 1930s, stressed the importance of solitude to those who would seek the wilderness experience (left), and cautioned that the sounds of mechanized transport obscured both the silence and the sound of nature, as well as the sense of remoteness that characterizes wilderness. On the right, a helicopter provided government-sanctioned access in 1976 to a Siberian Wilderness Area of the former Soviet Union.

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Origin of Political Conflict in Arctic Wilderness Areas

James N. Gladden

Abstract—There are several important factors related to political conflict associated with arctic wilderness areas: scientific studies, economic interests, ethnic identities, geographic differences, and national histories. How groups with an interest in these wilderness areas inject their values into these factors stimulates political debate with each other and with stewarding agency officials. Analyzing the mixed currents of scientific, economic, ethnic, geographic, and historical values of user groups can help officials better appreciate the politics of managing wilderness areas. This work also points out three shared goals of the eight arctic nation-states for managing wilderness areas in the circumpolar region.

Introduction

As land areas designated by public policy to protect natural and cultural values, wilderness areas in the Circumpolar North are often the focus of political conflict. Eight nation-states have sovereign jurisdiction over the wilderness and wildernesslike portions of the arctic: Russia, Finland, Norway, Sweden, Denmark/Greenland, Iceland, Canada, and the United States. Each national government has enacted public policy to conserve natural areas and cultural traditions. There are many types of protected land categories, and they include strict nature reserves, national parks, wildlife refuges, and designated wilderness areas. It is also the case that some governments at the subnational level in the arctic have approved policy measures to protect public lands in their jurisdiction for wilderness values. For example, the governments of the State of Alaska in the United States and the Yukon Territory in Canada have set aside some of their public lands to protect them from economic development. This includes not allowing certain activities such as road building, mining, logging, or drilling for oil and gas deposits. The focus of this paper, however, is on efforts by some of the national governments of the arctic to protect wilderness values on a portion of their public lands. These values relate to governmental policy for preventing the eventual loss of most natural areas to more intensive forms of human use. They also involve policy for assisting indigenous people and other rural residents to continue customary hunting and gathering practices.

The approval process for wilderness management plans is a common forum for conflict. Approving and implementing these plans generate conflict among interest groups and between the stakeholder groups and public managers. This paper offers an explanation of the origin of political conflict for managing natural areas in the Circumpolar North. The analysis may also help explain the origin of political conflict in managing natural areas for other regions of the planet, such as Amazonia (Young 1992).

Conflict appears to originate from five factors in the arena of wilderness politics: (1) scientific studies, (2) economic interests, (3) ethnic identities, (4) regional geographies, and (5) national histories. These factors of wilderness politics divide the citizen body of each arctic nation-state into interest groups with opposed policy goals. This is especially true of democratic political systems, where citizens have the freedom to organize into groups and lobby government officials. A closer study of these factors may provide some ideas for how arctic wilderness managers can reduce the level of conflict, or at least offer a greater appreciation of the origin of political conflict.

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Wilderness Politics

Politics involves power struggles and conflict between factions, with stronger groups tending to get more of what they want in public policy outcomes. These groups have more influence by virtue of the greater resources they can draw upon. Some resources include organizational skills, financial wealth, and the size of the group. Wilderness politics is also about the ability of some interest groups to control the discourse on policy issues about what wilderness means and how people should relate to it. Those with the power to shape the language and define the framework of the debate are most able to shape the policy process to their liking. This observation about the use of language suggests the power of ideas as a force able to shape human perceptions and social behavior. It is also possible to view politics in a positive way as an effort by organized groups to cooperate with each other to achieve certain goals of mutual interest. Politics can be about the desire of powerful groups to help underrepresented groups, such as minorities or even future generations, achieve certain goals.

The concept of wilderness includes two parts of a single and larger reality. One is a complex ecology of physical objects with forces that make dynamic changes in the natural system. The other is human perceptions and ways of assigning value and meaning to the natural world. Wilderness is a construct of culture, as well as a biophysical reality, and people get involved in the arena of wilderness politics to support their beliefs, values, and interests. What are these, why do they come into conflict, and how can answers to these questions help arctic wilderness managers to better appreciate the politics of wilderness? Political conflict originates in the spheres of scientific studies, economic interests, ethnic identities, geographic differences, and national histories. Each is discussed in a separate heading, but complex social relations make numerous overlaps among the five factors a usual state of affairs.

Scientific Studies

The increase of knowledge about the physical, biological, and social aspects of wilderness has been considerable over the past several decades (Hendee and others 1990). Since its inaugural issue in 1995, the *International Journal of Wilderness* has published the results of many wilderness studies. Although there is a constant increase of scientific information, disagreement over managing wilderness areas continues as a norm of political behavior. User groups continue to struggle with each other and to disagree with many policy choices made by wilderness managers. This is not a reason to decrease study of the many issues relevant for managing wilderness. It is rather a justification to redouble the effort to move policymaking onto a more rational level of discourse. This observation does not obviate the fact that findings of wilderness studies seldom provide answers to questions that all interested parties can agree on. Agreeing on facts, itself often a difficult thing to do, seldom leads to concord among actors on the values they want to inform arctic wilderness policy debates. If a study produces findings that support a given policy, those who oppose the policy will probably find ways to either ignore or deny the results.

Public agencies, charged with managing wilderness areas for their natural and cultural values, need various sorts of information to help them make better land use decisions. One important type of knowledge comes from the empirical studies of scientists working in a variety of academic disciplines. It is essential for the managers of arctic wilderness areas to better understand the dynamics of the physical and biological properties of ecosystems. This is important for gauging the impacts of human actions on the natural qualities of wilderness areas. For example, studies of lichen pasture conditions in Finnish Lapland show high levels of overgrazing by semidomesticated reindeer herds (Helle and others 1990). Too many reindeer are grazed on the same pastures for the entire year, and the lichen plants are unable to recover. This overuse occurs throughout much of the region, and includes public lands set aside by the Finnish Parliament in 1991 in the Finnish Act on Wilderness Reserves (17.1.1991/62). These scientific studies suggest a clear need to reduce the size of the reindeer herds, but the owners and managers of reindeer cooperatives in Finnish Lapland see this as a threat to their economic future.

In an odd reversal of the norm, scientific studies can also be used to support certain forms of economic activities if they can be shown to not disrupt the ecology of natural areas. For example, the 1991 Finnish Act on Wilderness Reserves requires agency managers to develop a program of natural forestry in wilderness areas. The Finnish Forest and Park Service has a test plot for gentle logging located near Ivalo, a town in Finnish Lapland near Lake Inari. Research has been conducted in other arctic forest areas to evaluate the impact of selective tree cutting techniques on bird populations (Jokimäki and Inkeräinen 1995). These findings can be employed by policy officials to decide if gentle logging is compatible with the natural workings of a forest ecosystem. Those with a more purist concept of wilderness may see logging for commerce as counter to the very idea of a natural area.

Another example of how scientific studies may contribute to political conflict relates to better ways for developing oil and gas deposits that have a small level of physical or visual impacts on a surrounding land area. As new techniques come on line, an energy company may be able to greatly reduce ecological and even the aesthetic impacts of oil and gas drilling in natural areas. Those resisting this type of future use of wilderness areas value the symbolism of having places free of any sort of oil drilling, even if scientific studies cannot identify any ecological harm. The politics of science suggests that the policy relevance of findings over the effects of human uses on the ecology of natural areas is burdened with competing values. The use of scientific findings shows that politics often eclipses analysis in the policy process, when competing views clash in the political arena.

Economic Interests

How people make a living and derive income, or build wealth and engage in self-supporting work, is the basis of much of human activities. People who live in remote northern communities are often tied to a direct use of natural resources to meet their economic needs. This is true for income-generating work, such as grazing reindeer or logging trees. Protecting the wild qualities of natural areas, however, requires the imposing of definite limits on expanded forms of economic activities. Another major form of economic activity is found in the subsistence practices of hunting and gathering. A large number of residents of northern rural areas live near public lands rich in fish, game, and other wild resources. Access to these lands and the right to harvest resources for personal use is a long-standing tradition in most arctic communities. The policy problem is how to allow the use of wilderness areas for subsistence and commercial purposes, but at the same time to not compromise their natural qualities.

One type of conflict between groups over economic interests is who gets to use wilderness areas in what ways and for what tangible benefits. The future of nature tourism in the arctic is a growing issue, given the attraction many people who live in temperate latitudes feel toward the north. An example is found in the municipality of Enontekiö, located in Finnish Lapland. As the manager of four wilderness areas in the region, the Finnish Forest and Park Service is in conflict with some local residents and the municipal government over managing nearby wilderness areas. The agency has established an office to promote nature tourism by advertising the wild virtues of the region, and also rents cabins and sells fishing and hunting permits. Some local people see doing the latter as a major threat to their customary rights to fish and game resources in the area (Ylitalo, personal communication). Some residents also fear that the Finnish Forest and Park Service, by capturing much of the revenue from nature tourism in the future, may deny local people the opportunity to increase their income (Ahopelto, personal communication).

As a word, "wilderness" is rich with meaning for people living in urban areas to the south, and the aura of unspoiled nature is a magnet for tourists. Of course, entrepreneurs are prohibited from placing infrastructure inside the legal boundaries of wilderness areas, but the building of hotels and restaurants to support an increase in tourists is possible on nearby lands. Some areas are easier to reach than others, given highways and airports, and infrastructure can be expanded. Business firms based outside the north, with large amounts of capital to invest, might out-compete local people in efforts to run small business ventures for nature tourists. Without a viable economic base, there is a bleak future for most arctic communities in remote areas (Young 1992).

The goal of public policy for nature tourism in and around wilderness areas should be to help northern residents develop ways to earn income that do not degrade ecosystems or rural traditions. The growth of a global economy, stimulated by rules of the World Trade Organization to promote freedom of commerce, may preempt arctic states from approving nature tourism policies that favor local business interests. The national governments of the arctic states might consider banning companies based outside the region from coming in and setting up nature tourism operations. They could also provide favorable loans and technical advice to assist residents and local governments in developing nature tourism in ways that protect the ecological integrity of the areas. This requires inventing new policymaking structures for use by agency managers and the people who live near the designated wilderness areas.

Ethnic Identity

The Circumpolar North is populated by diverse human cultures that were often deeply established in the region prior to the arrival of European explorers and settlers. The focus of an ethnic identity is on a group of people with common social values shared through their history, language, and customs. There are many ethnic groups in the north, including the Skolt Sami of Russia and the Inuit of Canada. The ethnic identity of arctic peoples is closely tied to how the members of a group perceive their relation to the land and the appropriate use of natural resources. Klein (1994) argues that the western idea of wilderness is foreign to how people with indigenous cultures perceive their natural surroundings. Catton (1997) uses the idea of inhabited wilderness to suggest that aboriginal peoples in Alaska are an integral part of the land base they live and work on as subsistence users, and this includes wilderness areas that have been designated by Federal legislation.

Conflict arises over how much access local people should have to wilderness lands and the uses in which they can engage. A bruising policy debate arose over the use of all-terrain vehicles in Anaktuvuk Pass, a mountain village of Nunamiut Eskimo in the central Brooks Range of Alaska (Catton 1997). To the residents of the village, these machines were the only practical means of gaining access to migrating caribou herds through mountain passes during the snow-free season. Managers of the Gates of the Arctic National Park and Preserve argued that operating these vehicles was not legal on wilderness lands. Most environmental groups sided with the agency's interpretation of the Alaska National Interest Lands Conservation Act of 1980 (Public Law 96-487), and the conflict was only resolved by taking some acreage out of the National Wilderness Preservation System.

The future is unclear regarding the political impact of ethnic identity on policy decisions for managing arctic wilderness areas. As the forces of globalization increase in the present century, it may decrease the strength of ethnic identities. Some groups within the indigenous peoples in the Circumpolar North wish to gain more political control over making land use decisions where they live. For example, some members of the Sami Parliament in Finland question the authority of the Finnish Parliament to manage public lands in the region (Aikio 1997). The national government in general is opposed to the loss of sovereign control of its arctic region, but is willing to share political power in a more limited sense. There are other examples of emerging institutions controlled by ethnic groups that are prepared to take on a larger role in making land use decisions. A few include Home Rule in Greenland and the North Slope Borough in Alaska (Young 1992).

A proposed devolution of political power amounts to breaking apart the status quo system of nation-states by proposing new centers of policy control over land use decisions. It suggests the forming of smaller units of political society for local people to exercise more policy authority over managing the protected natural areas. Osherenko (1988) defines comanagement as a sharing of power by local people with policymakers and others who live outside their communities. She favors a greater devolution of political authority so that rural residents can exercise more control over their lives. It is through these evolving subnational institutions that ethnic minority groups can have more input into land use decisions for the areas in which they live and work. To the extent this protects the natural capabilities of land to produce subsistence resources, it aids in the continuation of their traditional cultures.

Regional Geography

The arctic as a circumpolar region cuts across the sovereign territory of several arctic nation-states. This division sets up a north-south dynamic of political conflict between the two regions of each country. This is true for all of the arctic states, except for Iceland. It is the only nation-state with sovereignty over a part of the arctic region that does not fit into the north-south category of the politics of geography. Iceland also has no ethnic divisions, given that its small citizen body has a shared culture. However, wilderness politics clearly exist in Iceland. One large issue now in focus is a continuing debate on whether to permit the building of large hydroelectric facilities as a spur to economic growth (Thórhallsdóttir, this proceedings). Going forward with these projects will have negative impacts on natural areas set aside by the national government to maintain their wild values, and the issue has generated a national debate. It may also be noted that the United States and Denmark are the only two nations with arctic lands that are not contiguous with the rest of their countries.

People who live and work adjacent to protected areas often see their use in terms apart from those who carry on their lives outside the region. Young (1992) refers to the core and periphery regions of the arctic states to describe a political dynamic, based on geography. Most of the national populations of the arctic states are in the southern part of the countries. This is also where the most intensive land use and modification of the natural world has taken place. In contrast, the northern periphery regions have few people and lots of open space, with land areas relatively unchanged by economic development activities. People living in the southern regions of the arctic states exercise most of the political and economic control in a given nation. As many lands in the north are owned and managed by national government agencies, the policymaking power for deciding uses of their natural resources lies mostly in the south. Finland is a member of the European Union, and future uses of lands in Finnish Lapland may be partly decided in this policymaking framework.

Local people living near arctic wilderness areas should be able to exercise a significant amount of control for shaping land use rules in these areas. They stand to gain or lose the most in terms of policy choices for a number of economic and cultural reasons. Young (1992) offers a theory of dependency and internal colonialism, based partly on power relations between the northern and southern regions of the arctic nation-states. He favors more control by people who reside in the Arctic region and live near the areas where land use issues arise. The devolution of policy authority over a land base may result in several outcomes. Some environmentalists are uneasy with allowing a large amount of authority for managing wilderness areas at the local level of control (Wuerthner 1999/2000). They fear this power might be used to erode the ecological integrity and wilderness character of natural areas. However, many people living in rural communities realize that a conserving and sustained use of wilderness is perhaps the best prescription for their long-term future.

Political conflict between northern and southern regions in arctic states will persist. In ironic ways, southern urban regions with a demand for raw materials, such as crude oil or natural gas, constitute a significant threat to the health of arctic ecosystems. A disrupting of the ecology of natural areas comes not only from people who use them for reindeer herding and other activities, but from industrial forces based outside the region. This includes air pollution transported from the southern latitudes with centers of industrial development to wilderness areas in the arctic region (Young 1992). Dealing with this problem requires negotiations on an international level of diplomacy and treaty-making. Another potential threat to arctic wilderness areas may be a demand for recreational use in the future. There is a need for more research to study the social carrying capacity to place limits on the number of nature tourism visits, or to change visitor behavior through wilderness education programs.

National History

The national history of an arctic country has an influence on the types of public policies that get approved for managing wilderness areas. Population growth, industrial development, demographics, and other factors help shape wilderness policy

decisions. The national populations of the eight arctic states are located mostly in their southern regions, with human settlement thinning toward the north. As a social movement, the values of environmentalism have made inroads into industrialized democracies with advanced economies. This includes the arctic states, with the Russian Federation also trying to move in the same direction. Inglehart (1989) notes the shift to postindustrial values by western European nations, including the Scandinavian countries. Rothman (1997) is less certain about the depth of such a paradigm shift in the United States, but he argues that Americans are in search of a quality of life that goes beyond a mentality of consumerism. This shift in social perceptions has an effect on national policymaking institutions in democratic countries. A heightened focus on the quality of life and amenity values puts more focus on policy goals for protecting arctic wilderness areas.

As noted earlier, there are eight arctic states in the Circumpolar North with established claims to sovereign jurisdiction. Each has its own land use history of expansion into the north, and this aspect of national history has shaped public attitudes toward the place of humans in the natural world. The land use history of a nation, in some respects, is the most comprehensive factor for explaining conflict over managing wilderness areas. In Russia for example, the progress of its national history has meant the adding of arctic lands and ethnic groups. As a sovereign in the nation-state system of the existing global order, and with numerous exceptions based on treaty regimes, each arctic country is free to craft its own land use policies for managing wilderness areas. Americans have a wilderness idea that in general does not apply very well to its arctic region. It comes out of its own unique national history of a frontier experience. This involved clearing aboriginal populations out of their homelands, usually by relocating them to other regions of the country. As a result, Americans living in the Continental United States tend to think of wilderness as a place where people only visit, but do not use its natural resources in any material sense. People living in rural Alaska near wilderness areas tend to see them more like arctic residents of Russia or Canada than most people who live elsewhere in the United States. The American concept of wilderness lacks a sense of meaning for Canadians, who identify it as a place people use for more than recreational pursuits (Grant 1998). Aboriginal peoples perceive wilderness in different terms than others who are not part of their ethnic groups (Klein 1994). As such, there is no intellectual consensus for defining and managing a circumpolar Arctic wilderness system with a uniform set of policy rules. However, there are some shared wilderness values between the eight arctic nation-states, and these will be explored briefly in the last section of this chapter.

An evolution of the national history of a given Arctic state can help to explain the origin of political conflict over wilderness values inside the country. This occurs as new meanings of nature evolve and there are shifts in values regarding the idea of wilderness. Nash (1982) argued that Americans in the 19th century saw wilderness as land to be tapped for the richness of resources such as ores, timber, grass, water, and wildlife. This view shifted in the 20th century to a national desire to set aside and preserve some areas in an unmodified natural condition on the public lands. It is hard to predict shifts in public attitudes and policy for managing United States wilderness areas in the arctic and elsewhere. Rothman (2000) argues that tourism in the American West leans more heavily on attracting visitors to national parks by constructing nearby theme parks, and that some youth would rather play computer games than interact with wild nature. His thesis suggests a growing interest in the many forms of virtual reality and possible shifts in the way Americans perceive nature, so that in the future protecting wilderness areas may lose political support.

As values toward nature evolve in the cultures of arctic nation-states, many user groups will continue the struggle to control policy debates over the future of wilderness areas. All of the Arctic states have urbanized populations, and as they move into a postindustrial era, shifts in economic affairs will change how people think about what wild nature means. For example, the traditional idea of wilderness in Finland is a place where people go to hunt, fish, and collect other renewable resources. Today, many Finns see wilderness in Finnish Lapland as places to get away from modern life and to enjoy a natural setting. The need to develop natural resources in northern Siberia and improve the standard of living in Russia may compromise the natural and cultural integrity of some of its wild lands.

Given the affluence of its oil operations in the North Sea, Norway may elect to place more of its arctic land base into wilderness areas.

Concluding Thoughts

This paper has explored five factors as tension points that ignite political conflict over managing arctic wilderness areas: (1) scientific findings, (2) economic interests, (3) ethnic identities, (4) geographic differences, and (5) national histories. The positions of interest groups with a stake in wilderness policy issues will be shaped by some or all these factors. These five elements employed to analyze the sources of political conflict over arctic wilderness areas do not work in isolation from one another. I have chosen to divide political conflict in the policy process into five categories to enhance the clarity of the origin of disputes. This helps to set out a typology of values and to provide a framework for analyzing Arctic wilderness politics, but it does not capture the complexity of the merging factors that spark the political conflict. One example of complex interactions between the five factors is the plan to develop the Northern Sea Route along the northern coastline of Siberia (Brigham 1991, 2001). This large-scale project would provide for the transit of cargo between Western Europe and the Asian Far East, and would facilitate the use of Siberian rivers to gain access to hinterland resources. Environmental groups in Russia and elsewhere are obviously concerned about the impact of this proposal on the natural and cultural features of the Siberian wilderness.

An evolution of wilderness values within these five categories of conflict-source factors continues to shape the politics of managing arctic wilderness areas. The addition of new scientific studies on natural areas will stimulate value shifts and political conflict. The evolution of a global economy and a heightened concern for protecting the cultural integrity of indigenous ethnic groups also suggest changes in managing arctic wilderness areas. As the 21st century deepens and there are challenges to the paradigm of the nation-state, a new politics of localism and regionalism may gain force. The rise of a postindustrial global society suggests the evolution of an environmental ethic with shared values for managing natural areas. However, predicting the future is uncertain, and the element of national history helps to explain why each Arctic state has its own ideas about wild nature and approaches to managing for those values.

What are some orienting values for managing arctic wilderness areas, regardless of the nation-state where they are situated? One place to begin is to inquire about the sort of values that promote an attitude of respect toward nature. There is a need to develop a discourse of politics for using natural areas in ways that protect ecosystems. Such a pattern has been the cultural basis of natural resource use by indigenous arctic peoples for thousands of years. A study of traditional ecological knowledge, as practiced by many circumpolar people in remote areas, is needed to articulate a unified wilderness idea for the Circumpolar North. Rural residents, in general, want to maintain the natural integrity of a land base so that it can produce wildlife and other resources to meet their economic and cultural needs. Knowing, caring for, and respecting arctic lands provide rewards that are sustainable over a long period of time.

Aboriginal groups and other residents of the high northern latitudes can teach southern people more respectful and sustainable ways for humans to live in the natural world. It involves the forming of a land ethic that uses the interest of nature without tapping into its capital stocks. It is the deploying of a postindustrial set of technologies to give humans a comfortable standard of living without eroding the quality of the natural environment. It is the evolution of a political discourse leading to new sets of policy for adjusting the long-term place of human beings on the planet. It is also about providing more local control for managing a class of problems that confronts any community when it sees itself as living in a bioregion (Gladden 1999). The outcome of a desired politics of arctic wilderness is an evolving discourse that teaches humans how to live with nature and to respect it through light and sustained use.

Viewed in a wider frame of ideas, arctic wilderness managers appear to support the goals of protecting the ecology and the character of wilderness areas. The first

goal involves managing wilderness areas so that ecosystems remain mostly unmodified and controlled by natural forces. This applies across a variety of types of wilderness areas, such as wildlife refuges and national parks, but especially for strict nature preserves. The second goal is perhaps more elusive, for it amounts to setting out ideas for defining the meaning of the character of wilderness. Wilderness is a cultural idea, as well as a biophysical reality. When people begin to discuss the meaning of wilderness it can produce many currents of political conflict. The understanding of wilderness has much to do with the values for which it is managed, and there is a great diversity of opinions on this question. A third general goal that wilderness managers can probably agree on is achieving social equity among the interest groups with a stake in using these areas. As stated earlier, residents living near wilderness areas, and especially aboriginal groups, should be considered for special uses of these areas. This policy orientation is one important way for traditional cultures in rural areas of the Circumpolar North to survive, and perhaps flourish, in the future.

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Protected Areas of the Central Siberian Arctic: History, Status, and Prospects

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Abstract—Before the Siberian Arctic was incorporated into the Russian Empire, it had been inhabited by small numbers of indigenous peoples. The first Russian settlers came to Siberia in the 16th century. The northern areas of Siberia had not been subjected to extreme anthropogenic influences before the Norilsk Industrial Complex started to be built in 1935. Negative anthropogenic impacts on nature became apparent after the end of World War II. During Stalin's rule, the idea of nature transformation in the interest of humans was proclaimed. It led to widespread "ecological cruelty." Newcomers from other regions of the U.S.S.R. came with the intention of "conquering" the North. They considered neither the interests of the indigenous population, nor the ecological features of the land. Decades of destructive use passed before the strategy was condemned. It was as late as 1985, in conjunction with Perestroika and M. S. Gorbachev coming into power, when the following Nature Reserves were established in Central Siberia: Stolby, Sayano-Shushensky, Taimyrsky, Central-Siberian, Putoransky, and Bolshoi Arktichesky. Current and potential threats to the nature of Central Siberia are discussed.

Human Impacts

The main economic value of Russia's newly acquired lands in central Siberia was highly valuable furs, which came both as a tribute from the conquered indigenous peoples and through trade and exchange. The constant influx of fur hunters from Russia resulted in a nearly complete extermination of sable within the whole of the Taiga Zone, including its northern part. The sable extermination reached its peak at the end of the 19th century due to the peculiar character of the social-economic situation. For the indigenous peoples and many of the Russian settlers, fur hunting was not a critical means of subsistence, but they could exchange skins for certain goods, including alcohol, with Russian merchants. After the numbers of sable had decreased due to overhunting, the price of skins increased considerably, and the economic profitability of sable hunting remained high. It made sense for a hunter, who spotted a sable's tracks, to chase the animal until he caught it, which sometimes took about a week. The price of a more valuable dark-colored sable skin was comparable to the price of a horse (it took a regular hired worker as long as a year to earn enough to purchase a horse). After the sable had been completely exterminated in a considerable part of its area, its hunting was banned, and Game Reserves to protect the surviving sables were established. As a result, the numbers of sable were restored by the 1930s, and it became a hunted species again.

A further impact on Siberian nature—particularly in the South—was connected with the construction of the Moscow Highway in the mid-18th century. The highway reduced the amount of time it took people to reach the Yenisey River from central areas of Russia from 2 years to 2 months. After the highway construction had been completed, and particularly when the Trans-Siberian Railway was built in 1897, there was a notable increase in the population of Russian people in Central Siberia. Thus, the Yeniseyskaya Province population increased from 570,000 to 1,200,000 from 1897 to 1914. Ninety percent of the population was concentrated in the central and southern parts of the Krasnoyarsk region.

The north, particularly the arctic areas of Siberia, had not been subjected to extreme anthropogenic influences before the Norilsk Industrial Complex started to be built in 1935. The economic situation that caused sable overhunting was unique for Siberia. Breakup of the traditional nomadic reindeer breeding also had tragic social

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consequences. It was initiated after the revolution of 1917 by the Soviet government for political reasons—a forced accustoming of “wild” nomads to the “civilized,” and resulted in an ecologically unacceptable, settled way of living.

Anthropogenic impact on nature started to be notably negative after the end of World War II in 1945. In the years of Stalin’s rule, the idea of nature transformation in the interests of humans was proclaimed. It led to widespread “ecological cruelty.” Newcomers from other regions of the U.S.S.R. had a purpose of “conquering” the North. They considered neither the interests of the indigenous population nor the ecological features of the lands. Decades of destructive use had passed before the strategy was condemned. It happened as late as 1985, in conjunction with Perestroika and M. S. Gorbachev coming into power.

Destruction of nature was furthered also by a strategy common for the U.S.S.R. It was named the “extensive economy.” It consisted of the unsustainable use of natural resources by movement from more densely populated areas to the less populated ones. To slow down this undesirable process, U.S.S.R. leaders issued decrees and resolutions to regulate all forms of nature use. These attempts were unsuccessful because similar resolutions and decisions were taken on one and the same point more than once. The U.S.S.R. Supreme Soviet’s resolution, “On the observation of the legislation requirements on nature protection and rational use of natural resources,” issued July 3, 1985, is characteristic in this respect. It is a vast document, containing lists of imaginative successes peculiar to this kind of resolution that accepted, in fact, that nature protection legislation was not observed in the country.

This kind of legislation violation used to be, and still remains, a big social and ecological problem. It is characteristic of the Russian mentality to perceive laws as imposed by the evil forces embodied in the power structures. This is a problem common for society: some States have already gone through this period in their historical development, but Russia has not. This country has never had a government that would take care of its people’s well being rather than taking advantage of them. Today, Russians witness an extreme social injustice in distribution of common property, so they will continue being suspicious of any activities advocated by the power structures.

The ecological and economic problems of the U.S.S.R. North were paid attention to only in 1984, when the U.S.S.R. Supreme Soviet Presidium issued a respective decree, “On the strengthening of the Far North nature protection...” The document accepted that the practiced methods of North “conquering” caused great damage to nature. The official disapproval did not mean that the state of affairs changed considerably in practice. From the industrial development and geological survey perspective, hunting and fishing were destructive. For the people practicing it, neither fish nor game seemed a critical means of subsistence. Consumption of resources did not undermine the economic well being of state employees, unlike for the indigenous population.

The changes that occurred in the period after World War II in the whole world made the majority of countries turn close attention to ecological problems. In the field of ecology, the changes were connected first with the activities of the Roman Club, and later with those of other nature protection and ecological organizations and initiatives—especially of the Rio World Forum in 1992. Destructive use of one’s nature became a sign of being uncivilized in the opinion of the world community. A criterion, by which ecological well being was judged, was the proportion of the areas that were specially protected. In Russia, Nature Reserves and Game Reserves used to and still constitute this category.

Another index is concern for the preservation of biodiversity, or the rare and threatened animal and plant species. To protect them, special Nature Reserves and Game Reserves were established. In the Krasnoyarsk region, the following Nature Reserves (“Zapovedniki” in Russian) have been founded since 1925:

Nature Reserve	Year of foundation	Area in thousands of hectares (acres)
Stolby	1925	47 (118)
Sayano-Shushensky	1976	390 (975)
Taimyrsky	1979	1,374 (3,435)
Central-Siberian	1985	972 (2,430)
Putoransky	1987	1,988 (4,970)
Bolshoy Arktichesky	1993	4,169 (10,423)

Judging even by these few numbers, there is a tendency that the area of each individual Nature Reserve decreases the further it is to the south of the region, where the Stolby and Sayano-Shushensky Reserves are situated. This tendency is common for the whole area of Russia. The reasons for it are obvious: there are a great number of areas in the North that will hardly be developed in the near future. Consequently, reserve establishment in the North allows having 3 percent of specially protected areas both in the whole country and in the individual regions. Thus, the country looks presentable by this index in the opinion of the world community.

When a reserve is established, a regular argument in its favor is abundance of rare species in the area that are included in the Red Books of the various ranks. In doing so, particularly convincing is the presence of endemic species. From this viewpoint, the idea to establish reserves in the Asian part of the Arctic is unconvincing. In its vast areas, the number of endemic species is insignificant. Thus, in the north of the Krasnoyarsk region, out of the three species of land mammals registered in the Red Books, only one subspecies is endemic, the northern snow ram (*Ovis nivicola borealis*). As for birds, there is also only one endemic species, the red-cropped brand goose (*Rufiborenta ruvicollis*). Nearly all the species of rare animals and birds require vast areas for survival, but only a small portion of these areas are part of the specially protected areas. Consequently, reserves cannot play any notable part in their preservation. The endemic species mainly inhabit Putoransky (*Ovis nivicola borealis*) and Taimyrsky (*Rufiborenta ruvicollis*) Reserves.

Also in the Taimyrsky Reserve, the musk ox (*Ovibos moschatus*) was successfully reintroduced. It used to inhabit Northern Eurasia. In the Taimyr tundra an experiment was started to spread musk ox, which is a representative of “mammoth fauna.” It used to inhabit Taimyr 1 to 3 thousand years ago, and became extinct due to unknown reasons. The experiment was a success—there are more than 1,500 head now that originated from 30 animals that were introduced from Canada and the United States. The reintroduced species has settled over the eastern part of Taimyr; from the northern extremity of the peninsula to the border of the southern tundra. The small number of endemic species in the Siberian Arctic is part of a general regularity of biota diversity that decreases the farther it is to the north.

Once an area is legally declared a Nature Reserve, the actual state of affairs regarding nature protection depends on the observation of the reserve regime—absence or minimization of the human impact on the nature of a certain specially protected area. At present, a complete exclusion of such an influence is impossible due to global human-caused processes and phenomena. Thus, the air pollution caused by the Norilsk Industrial Complex spreads 150 km (93 miles) to the east. The so-called “volley” exhausts are usually let out into the atmosphere at night (fig. 1).



Figure 1—“Volley” exhausts from the Norilsk Industrial Complex.

Another violation of the protected regime is deliberate poaching, which is underlain by mercenary ends. Its probability largely depends on the legal status of the protected areas: the staff of a Nature Reserve is the land user of the area, but the staff of a Game Reserve is not. The main land user does not carry out activities causing damage to nature. Often Game Reserves used to be established by local chiefs, to ban hunting and fishing in the richest game grounds and fisheries for the public, but not for themselves and their confidants. This may serve as an example of the self-mercenary lawmaking, which is quite characteristic for Russia.

On the whole, the following data on forest protection can characterize the problem's intensity in the sphere of Russian nature protection. In 1997, the Committee on Forests of the Krasnoyarsk region published a jubilee booklet telling of the Forest Service's achievements. The booklet says, "By the date 01.01.97 there were 2,444 inspectors of the State Forest Protection Inspection in the forestry enterprises of the Committee..." In 1996, the State Forest Protection Inspection of the enterprises revealed 1,146 types of forest legislation violation. Thus, on average, each inspector registered one violation during 2 years! A Forest Ranger's wages make up \$25 to \$35 equivalent in Russian rubles a month in the different districts of the region. For comparison, an average State employee in Russia earns \$50 to \$100 equivalent in Russian rubles monthly.

Employees of the reserves, forest protection, hunting, and fishing inspections are State workers. The actual level of their wages is lower in the North compared to that in the Central and Southern districts of the region, and the prices on consumer goods are 3 to 4 times higher in the Northern areas. In the Southern and Central districts of the region, the population supplies itself from their own kitchen gardens and by breeding cattle and poultry. In the North, additional food can only be obtained from fishing and hunting activities and from involvement in the tourist business. Limiting the activities of the population contradicts the modern rules of nature use.

The use of heavy machinery by the local population to move over the tundra results in the destruction of the soil cover. Today these activities are practically unregulated. Also, a correspondent of the newspaper *Nash Krai (Our Region)* on March 4, 2001, reported regular visits to Taimyrsky Nature Reserve by poachers—representatives of the local authorities.

In recent years, one more type of poaching appeared—for paleontologic values. These are, mainly, mammoth tusks, which are extracted from the banks of rivers (fig. 2). It is easy to get the mammoth tusks, as the ground is washed out by the rivers. The tusks serve as a natural currency that is paid to pilots in exchange for transportation of the hunters to remote areas (one tusk pays for one delivery). Poaching of tusks takes place in any area, including the area of the reserves. Another type of fossil value attracts poachers—household utensils and decorations of the deceased found in the ancient tombs of the Northern peoples.

A new threat to the merlin falcon (*Falco gyrfalco*), which is small in numbers, is catching and smuggling its nestlings (fig. 3) abroad where they are used as hunting birds. A trained bird of this species is worth about \$500,000 in the United Arab Emirates.

The reason for poaching is not only the hard economic situation of the local population, but also the greed of enterprising fellows. This is especially true for the fishing of sturgeons, whose numbers are steadily decreasing in the Yenisey River watershed, according to the report of L. D. Mitsukova and others, who are the employees of the Scientific Research Institute on the Ecology of Fisheries. A very small part of the Yenisey flows through the Central Siberian Nature Reserve. The bulk of the profit from the fish (60 to 70 percent) goes to the middlemen, who buy up the catches.

A potential threat to the nature of this region is development of oil and gas fields. The Yenisey-Khatangsky Oil and Gas Field has already started to be used, as well as the Western Siberian and Lena-Tungusky Fields that are partly within the Krasnoyarsk region. They are considered to be the greatest prospect in Russia, and their development will eventually lead to the degradation of the forest tundra, spread of poaching, and disturbance of the cryogenic regime in the area.

Figure 2—Mammoth tusks extracted from the riverbanks.



Figure 3—Merlin falcon (*Falco gyrfalco*) nestlings.

Conclusion

Today the Yenisey Arctic can be called a zone of patchy and bandlike development. The largest tract of heavily disturbed tundra is situated around Norilsk in a radius of 150 km (93 miles). Unsustainable industrial fishing of sturgeon and salmon along the whole of the Yenisey River takes place. The area of soil cover disturbed by cross-country machinery is expanding in the tundra. Nonrenewable paleontological and archaeological resources are increasingly extracted. The growth of oil and gas field exploitation will lead to the intensification of negative impacts on the nature of the North. Prevention of this undesirable process is not feasible. Under modern conditions, exercising strict administrative control over nature protection violations is not feasible economically or technically. To change the way of thinking of the Russians coming to the North from other regions requires a lot of time. A way out of this situation is not an expansion of the protected areas, but ecological education of the population. It should be started from an early age and be carried out both in families and at schools. The issues should also be covered more regularly in the mass media.

Northwest Territories Protected Areas Strategy: How Community Values Are Shaping the Protection of Wild Spaces and Heritage Places

Angela Stadel
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Abstract—The Northwest Territories Protected Areas Strategy (NWT PAS), approved in 1999, presents a unique community-driven approach to establishing a network of protected areas in the North. The NWT PAS arose from increasing resource development pressures in the Northwest Territories and is being implemented in the context of the land claim and treaty processes. Aboriginal communities in the Northwest Territories are using the NWT PAS planning process to identify protected areas that represent their values and meanings of wilderness. This is resulting in a shift in emphasis from tourism, recreation, and natural region representation largely reflected in the current system of protected areas to protected areas that represent the cultural, harvesting, wildlife habitat, and ecological values of Aboriginal communities. The first candidate protected area to receive interim protection under the NWT PAS was Sahyoue and Edacho, the two western peninsulas on Great Bear Lake in the Sahtu region. This candidate protected area is a nationally recognized cultural landscape, and is the source and living legacy of the stories of the Sahtu Dene. Sites like Sahyoue/Edacho being advanced through the NWT PAS present challenges for the agencies, legislation, and management regimes for protected areas, and point to the need for change in our definitions of wilderness, parks, and protected areas.

Introduction

Edehzhie, Mohwi Trail, Sahyoue/Edacho, Edzawoo Nahdeh ?ek'è, Waters of Desnedhé Che—the names of these proposed protected areas reflect the strength of the past, present, and future role of Aboriginal communities in taking care of the special places in the Northwest Territories. These special wilderness areas have always been highly valued by the people who lived on them, traveled through them, and are laid to rest there. As the pressure for industrial development of the natural resources of the North has increased, many communities have recognized the need for legislative tools and other effective designation mechanisms to protect special places for future generations. The discovery of diamonds in the 1990s and the more recent surge in gas exploration in the Northwest Territories has signaled the need for a concerted effort to identify, evaluate, and establish additional protected areas. As a result of a legal challenge by the World Wildlife Fund to the BHP diamond mine environmental assessment panel report in 1996, the Federal and territorial governments made a commitment to develop a protected areas strategy for the Northwest Territories.

It was recognized that a Protected Areas Strategy for the Northwest Territories would have to be developed and implemented in the context of both the settled land claims agreements and ongoing claims and treaty agreement processes. Currently, comprehensive land claims agreements have been signed in the Inuvialuit (1984), Gwich'in (1993), and Sahtu (1993) settlement regions in the northern half of the Northwest Territories. The Dogrib Treaty 11 Council, the Akaitcho Treaty 8 Tribal Council, the Deh Cho First Nations, and the South Slave Metis Tribal Council are at various stages in their negotiations with the Federal and territorial governments. To include the diversity of regional interests and to respect the precedence of these regional treaty and land claim agreements, a Protected Areas Strategy Advisory Committee was established in 1998, representing regional Aboriginal organizations

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in the Northwest Territories. The Committee also included Federal and territorial government representatives, as well as industry and environmental nongovernment organizations. Through consensus and consultation with their respective constituents, the PAS Advisory Committee guided the development of the Protected Areas Strategy. The resulting document, approved by the Federal and territorial governments in 1999, outlines a common set of principles, a framework for planning and establishing new protected areas, and an action plan for implementation. The inclusive and partnered approach demonstrated throughout the development of the strategy continues today, with a renewed Advisory Committee overseeing the implementation of the NWT PAS.

Community-Driven Planning Process

The PAS Advisory Committee defined the purpose of the Protected Areas Strategy as follows:

The Protected Areas Strategy should focus on developing an overall framework and set of criteria to guide the work of identifying and establishing protected areas in the NWT. The task of developing concrete proposals should primarily be left to communities, regional organizations and/or land claim bodies and processes (NWT PAS Advisory Committee 1999: 8).

An eight-step planning process (table 1) outlines how communities initiate and direct the task of identifying proposed protected areas. In Step 1, the community or regional organization takes the initiative to set priorities for protection. In some regions, this has been carried out through regional land use planning such as in the Gwich'in Settlement Area or through heritage studies or inventories like those carried out in the Sahtu Settlement Area (Sahtu Joint Working Group 2000). In regions where there is no formal land use planning process or land claim agreement, it is traditional knowledge and land use studies that form the basis for identifying priority areas for protection.

In the early stages of implementation, several communities with past park establishment experience were hesitant to become involved in the Protected Areas Strategy. The denial of harvesting access to protected areas such as the Thelon Game Sanctuary and Wood Buffalo National Park had left some communities with a negative impression of parks and protected areas. The more recent experiences of the

Table 1—Steps in the Northwest Territories Protected Areas Strategy planning process and status of proposals (July 2001).

Step	Planning process	Status of proposals
1	Identify priority areas of interest.	Waters of Desnedhé Che, Jean Marie River Watershed, Pehdzeh Ki Deh, Hook Lake/Slave River Delta
2	Prepare and review protected area proposal at regional level.	Mohwi Trail Edzawoo Nahdeh ?ek'è
3	Review and submit proposal for candidate Protected Area status.	Edézhzié
4	Consider and, where necessary, apply interim protection for candidate area.	
5	Conduct detailed evaluation of the candidate area's cultural, ecological, and economic values.	Sahyoue/Edacho candidate protected area
6	Seek formal establishment of protected area.	
7	Approve and designate protected area.	
8	Implement, monitor, and review protected area.	

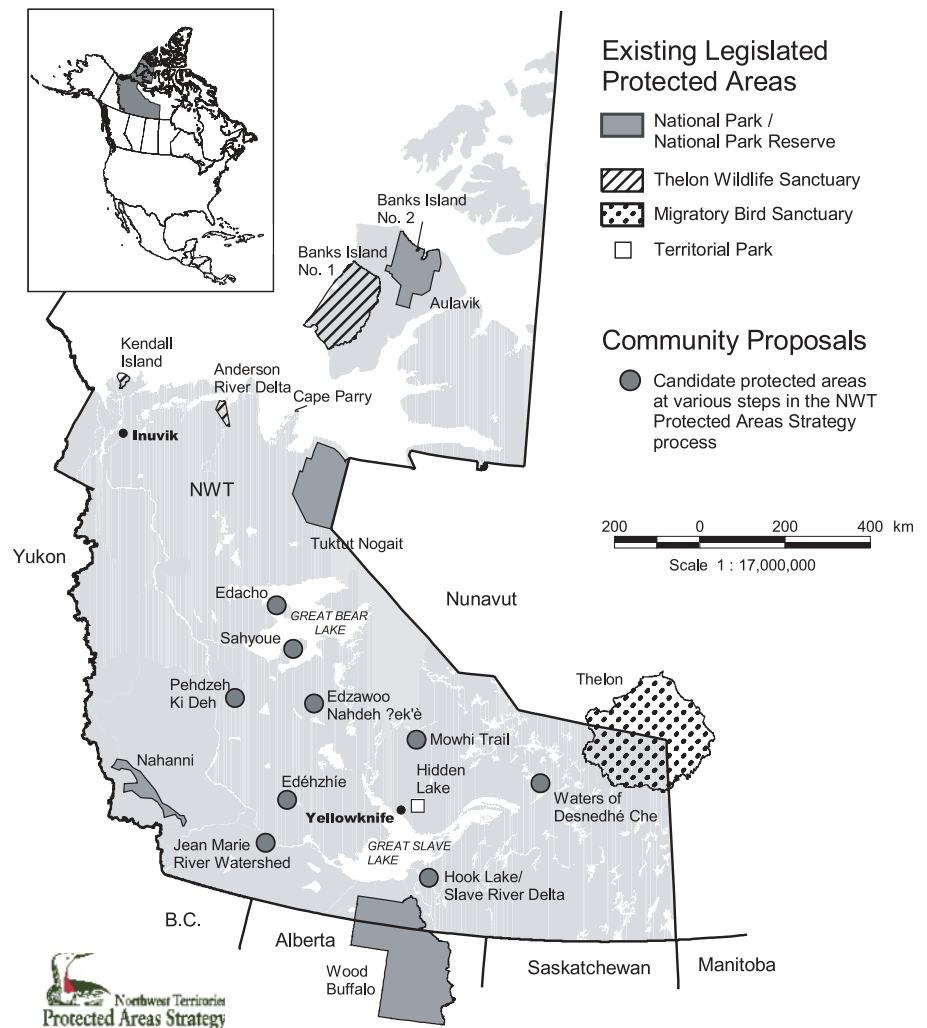
Inuvialuit with the establishment of Tukturnogait, Aulavik, and Ivvavik National Parks, through the negotiation of the Inuvialuit Final Agreement, have provided valuable examples of a new way to designate and manage protected areas. The Inuvialuit communities' priorities for protecting the calving grounds of caribou and ensuring the future of harvesting resulted in the establishment of these three new National Parks.

A Protected Areas Strategy Secretariat was established to provide funding and technical and administrative support to communities, as well as to identify regional organization priorities and to plan for the establishment of protected areas in their regions. For the first year of implementation, the PAS Secretariat focused its efforts on informing communities about the planning process and supporting initial community workshops to identify priority areas and values. The implementation of the NWT PAS is still in the early stages, and to date, 11 communities have held workshops that resulted in the identification of eight priority areas of interest (fig. 1). Two of these areas have advanced further through the planning steps of the PAS (table 1).

New Goals for Protection

The NWT PAS outlines two goals for establishing new protected areas: (1) protect special natural and cultural areas, as defined by northern residents who know best which lands and waters are most critical to sustaining their land-based economies, values, and cultures; and (2) protect core representative areas within each ecoregion.

Figure 1—The Northwest Territories Protected Areas Strategy community proposals.



Goal 1 has been the driving force behind the protected area proposals being advanced by communities, while Goal 2 has been used to provide additional support to proposals. Many of the ecoregions of the Northwest Territories are still inadequately represented in the current system. Each candidate area is assessed to determine whether they adequately represent landscape units within ecoregions. Landscape units are determined primarily from soil characteristics and landforms, which along with climate and water, create the dimensions of habitat, which can be used to approximate biodiversity (Oosenbrug and Gah 2001, unpublished).

These areas of high biological diversity may in some cases overlap with the special areas that have been identified by the communities. There is increasing recognition that rich biological diversity often coincides with cultural diversity (Oveido and Brown 1999). Edézhíe, an area of high cultural value, encompasses an ecoregion (Horn Plateau) that is not represented by the current protected area system. This candidate protected area also includes Mills Lake, one of the richest migratory bird habitats in Canada. This area is valued by the Deh Cho communities for its cultural significance as a gathering place and as a place where game is always plentiful during times of scarcity. Edézhíe is also valued as a distinct and scenic physiographic feature, rising up to 600 m above the surrounding flat landscape, and as a source of fresh water (Cizek 2001).

Wilderness Values in the Northwest Territories

The emphasis on community priorities is influencing how protected areas are selected and how wilderness areas are valued in the Northwest Territories. The values for wilderness, land, and water that Northerners hold are reflected in the following excerpt from the PAS vision:

Our lands and waters sustain all life and are the primary source of spiritual inspiration, education, legends, history and economic well-being. For many northerners the land is an integral part of who we are and how we define ourselves. This deep-rooted connection to the land is reflected in words heard often across the north, "The land takes care of us, we take care of the land" (NWT PAS Advisory Committee 1999: 7).

Northern Aboriginal peoples are acting upon a perspective that integrates human, social, and cultural affairs in the definition and management approaches to wilderness areas (Roots 1995). Some of the key values for protection that are emerging from the community proposals in the Northwest Territories are: significant past and present harvesting areas, spiritual sites and burial grounds, and traditional travel routes. Documentation of traditional knowledge through oral histories and mapping is an essential component of the communities' proposals for protecting areas. Traditional place names and knowledge of habitat, fishing, hunting, and trapping areas are determining the location and size of the proposed protected areas. Watershed protection is another key value that is emerging from the protected area planning that communities are undertaking. Traditional knowledge is increasingly becoming an integral part of resource management planning, and is seen as a valuable source of ecological information by the Western scientific community (Johnson 1992). In the past, traditional knowledge has not commonly been used to define wilderness and protected areas (Huntington, this proceedings). In the case of the NWT Protected Areas Strategy, traditional knowledge provides the basis for the initial definition of the protected area and its values. Information on the ecological and economic values collected by government, industry, and environmental nongovernment organizations is used to support, and in some cases modify, the proposal.

The wilderness values held by visitors to northern wilderness areas include: solitude, place of mystery and the unknown, and a place with little or no human occupation (Kaye 2000). These same areas are valued by the people who live in the North as gathering places, and places that are named and intimately known, and have been used and occupied since time immemorial.

Sustainable resource use by Aboriginal communities is a significant feature of many protected areas in the North and represents a necessary break from southern concepts of wilderness (Lucas 1995). There are some wilderness values that may be shared by both visitors and residents. In his study of wilderness meanings associated with the Arctic National Wildlife Refuge, Kaye (2000) describes other key values, such as wilderness as a place of intrinsic value, as a bequest for future generations,

and as a sacred place. Some of the values and meanings of wilderness may be shared, but how they translate into the management of activities in those areas can result in conflict. An example is the use of motorized vehicles, such as all-terrain vehicles, snow machines, or motorboats in wilderness areas, often used by residents to access remote areas for harvesting. Many visitors to a wilderness area travel by nonmechanized means, such as canoe or kayak. The draft Thelon Game Sanctuary Management Plan (2000) recommends a mandatory permit system for nonmotorized travel by visitors, commercial guiding operations, and non-Aboriginal people, while recognizing Aboriginal peoples' needs for motorized access to the Sanctuary for harvesting.

Sahyoue/Edacho: Land and Narrative

Wilderness areas in the Northwest Territories are also being defined as sources of cultural identity. Sahyoue/Edacho, also known as Grizzly Bear Mountain and Scented Grass Hills, is such a wilderness area in the Sahtu settlement area of the Northwest Territories. Sahyoue/Edacho exemplifies the shift that is taking place in which the history and values of Aboriginal peoples are changing the definitions of heritage places and wilderness areas in Canada. Sahyoue/Edacho is the first candidate area to receive interim protection through the NWT Protected Areas Strategy. This wilderness area is essential to the history of the Sahtu Dene, whose oral tradition and stories are tied to this land and help define who they are as a people. Sahyoue/Edacho are the two western peninsulas of Great Bear Lake, the eighth largest lake in the world, and the largest lake wholly contained within the boundaries of Canada. The people of Deline and the Sahtu settlement area want to preserve their stories by preserving their origin—the lands and waters of Sahyoue/Edacho. Through recording of oral histories and mapping the stories, and archaeological features, a proposal was made to the Historic Sites and Monuments Board of Canada for national commemoration of the area. The Agenda Paper to the Historic Sites and Monuments Board describes how stories are linked to the land. Some examples of this are stories of a time when giant animals inhabited the land—according to Dene elders, many land features are formed around the bodies of these animals (Hanks 1996). This is reflected in the story, “How Manitou Island Got its Name,” as told in this excerpt from a transcript by George Kodakin (in Hanks 1996):

One calm morning when everybody was asleep, a woman who was sewing heard something in the water in the direction of Grizzly Bear Mountain. She went outside to see what it was and saw a big animal going into the water where the whirlpool used to be. But just as soon as she saw it, the animal turned into a large rock. This animal, which was a giant mother wolf, turned into the island which today in English is called Manitou Island. That is why our elders before us taught us to show respect by making an offering when you are in the area. Our elders also taught us if you are curious as to how long you will live you can test that out by entering the cave and by running from the end of the cave to the opening without falling down.

In 1998, Sahyoue and Edacho were designated as National Historic Sites to commemorate the significant cultural landscape of the Sahtu Dene. A National Historic Site of this size (5,587 km²) is a first for Parks Canada in its National Historic Site program. The Commemorative Integrity Statement for Sahyoue/Edacho calls for the land base of these areas to be legally protected to a standard that maintains present-day environmental quality and that encourages Sahtu Dene cultural practices (Nesbitt 2000). The community of Deline recognized that commemoration of these areas alone would not protect the land base from industrial development, and therefore decided to seek land protection through the NWT PAS.

Challenges for Protected Areas Planning

Increasing recognition for Aboriginal rights to self-determination and respect for cultural diversity is having an important impact on the way protected areas are planned, established, and managed (Oviedo and Brown 1999). The protected area proposals emerging from the Protected Areas Strategy present challenges to the process and policy framework for protected area identification and establishment in the Northwest Territories.

For communities to effectively engage in the PAS process and continue to drive the process of identifying, evaluating, and establishing protected areas, they must have the capacity to do so. There are many demands on leadership at the community level, and competing priorities in self-government and treaty negotiations, health, social services, and economic development can make it difficult to maintain the momentum behind protected area initiatives.

While funding and technical support is made available to communities, finding community people to focus on the protected area planning work can be difficult. Many of the communities in the Northwest Territories have populations of less than 500 people, and 44 percent of the population of the NWT is below the age of 25 (NWT Bureau of Statistics, based on 1996 Canada Census). The NWT PAS recognizes the need for flexibility and that each region or community has its own process for defining and documenting values and making decisions. At the same time, the NWT PAS Advisory Committee and the Secretariat are addressing the need to provide some consistency in the criteria and the level of information, both scientific and traditional knowledge, required to make informed decisions on the establishment and boundaries of the protected areas.

The NWT PAS is designed to be an inclusive and transparent process that involves other stakeholders such as industry and environmental organizations. Involving these partners in a community-driven process is challenging, but critical to gaining wider support for new protected areas. Two environmental organizations, the World Wildlife Fund and the Canadian Parks and Wilderness Society, currently play a significant role in the early stages by providing funding to communities and, in some cases, participating in workshops. Industry organizations are primarily involved through the Advisory Community and are kept informed and involved as new sites are being advanced through the PAS planning steps. Industry representatives also contribute to the development of overall policy guidelines for nonrenewable resources assessment, interim protection, and compensation.

Current protected area legislation does not necessarily reflect the focus on cultural values and regional priorities that are emerging from the PAS community proposals. Parks Canada is guided by a national system plan with the goal of representation of each natural region of Canada. Parks Canada has made significant steps toward adapting its policies by agreeing to sponsor Sahyoue/Edacho and to consider it as a potential part of the National Parks System (Copps 2001). Parks Canada has also developed a definition of Aboriginal Cultural Landscapes, and has developed guidelines for their identification and evaluation (Parks Canada 2001). The current system of Territorial Parks focuses on recreational and scenic values through campgrounds and wayside parks. The Territorial Parks legislation is currently under review, as it has not been applied to large cultural and natural areas that require protection from nonrenewable resource activities. The Canadian Wildlife Service is exploring ways to adapt its National Wildlife Area legislation and regulations to areas of harvesting and cultural values, as a result of its work with the Deh Cho communities on the Horn Plateau. The role of regional land use plans in providing effective tools for protection presents challenges to the current definitions of protected area but also new opportunities for a more flexible and adaptive approach. The Gwich'in Land Use Plan and Sahtu Land Use Plan may become significant tools in defining and protecting significant areas on both Aboriginal owned land and Crown land.

New Directions for Wilderness

Some authors (Callicott 2000; Magga 1995) suggest that the term "wilderness" is ethnocentric and should be avoided. This may be difficult, as "wilderness" has become part of the conservation and tourism lexicon and will continue to attract visitors to the remote areas of the Circumpolar North. Instead, the definitions of wilderness should recognize northern peoples' values of wilderness areas as places that are part of a cultural identity, or as Stumpff (2000) describes, "places of origin and life." Protected area designations that encompass the values held by Aboriginal peoples need to be considered and incorporated into legislation and management plans. The World Conservation Union (IUCN) protected area Category V (protected landscape and seascape) is particularly appropriate to the types of protected areas emerging from the NWT PAS, as it recognizes the interaction between people and

nature over time and has specific objectives related to the conservation of cultural heritage. New designations, such as the Sustainable Development Reserves in Brazil (Charity and Masterson 1999) or “life reserves” suggested by Sochaczewski (1999), need to be explored for applicability in the Circumpolar North. Formal tribal wilderness designations, such as the Mission Mountains Tribal Wilderness in Montana and the Indigenous Protected Areas in Australia (Bridgewater and others 1999), provide potential models for protected areas on Aboriginal owned lands and require further examination for possible application in the north. Education of the public (visitors and residents, academia, and protected area managers) regarding definitions of wilderness that reflect a diversity of values will be critical for reaching understanding and perhaps even compatibility in how wilderness areas are defined, used, and managed in the future.

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Collaboration Across Cultural Boundaries to Protect Wild Places: The British Columbia Experience

Robert E. Pfister

Abstract—Culture counts in the protection of wilderness! Culture can be defined as the shared products of a given society: its values, norms, knowledge, and ideals, as well as its material goods. If history reveals nothing else, it teaches us that the norms, values, ideals, and language of a society are what defines wilderness. What one society calls wilderness, another society calls home. Such cross-cultural differences in understanding what constitutes wilderness over time is well documented in literature. Recognizing the historical variation between cultural groups is an essential first step in building alliances for wilderness protection and management that will endure the test of time. Perhaps the need for bridging cultural differences is no more evident than in the Circumpolar North where norms, values, and ideals have a rich variation among people living in landscapes containing diverse qualities of wilderness.

Less documented in the literature is how to overcome cultural differences and advance a collective vision about protecting unique wilderness ecosystems. An essential step in consensus building is to embrace a collaborative decisionmaking process that favors shared ideals about wilderness protection. One approach being tested in six British Columbia locations, as well as elsewhere, is a collaborative process involving diverse cultural values concerning wilderness. It is timely, therefore, to examine the principles and practices required for such a collaborative process and the nature of the institutional arrangements that are working in northern British Columbia to protect wilderness values. In light of the ongoing changes in the Circumpolar North, lessons learned in British Columbia might assist other jurisdictions seeking to adopt collaborative decisionmaking as a strategy that favors cross-cultural communication and agreement.

Introduction

Many of the great debates on wilderness have argued that it is important to make a distinction between a conservation (ecocentric) and societal (anthropocentric) rationale to protect wild places (Callicott and Nelson 1998; Hendee and Stankey 1973; Nash 1971; Soulé 1998). Historically, participants attending meetings of the World Wilderness Congress have agonized over the precise wording of a “wilderness” definition that eventually would be an accepted definition globally for the World Conservation Union (IUCN) Category I classification (Martin 2001). In defining the character of wilderness, human presence has been a contentious issue. One element of the ecocentric versus anthropocentric debate arises from the desire to curtail almost all forms of extractive and consumptive activities. In the case of legislated wilderness, research began nearly 40 years ago to examine how many visitors an area might accommodate (Wagar 1963), and more recent assessments have been undertaken to examine common problems of wilderness use (Cole and others 1987) as well as recreation conflicts among different types of visitors (Watson 1995). Even provocative management proposals for “no-rescue” zones within wilderness areas have been proposed, which would allow back-country travelers to meet nature on its own terms and to be solely responsible for all risks they experience in the wild (Allen 1981; McAvoy and Dustin 1981a,b; McAvoy and others 1984; Peterson 1987; Wagar 1981). Each of these illustrations highlight the diverse ways in which the subject of human presence in the wilderness has captured or provoked the attention of both the social and natural scientist.

Today in the northern latitudes, human presence is considered in yet another context, that is, recognizing the potential of protected circumpolar wilderness as a homeland for indigenous people. Aboriginal presence in wilderness has now been accepted as an IUCN standard by allowing “indigenous communities to continue

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living in low density and in balance with available resources to maintain their lifestyle” (Martin 2001). Recent legislation in Finland recognizes the value of protecting wildland from development for the benefit of the Sami people (Kajala and Watson 1997). Protecting wildland for the benefit of aboriginal people in British Columbia has directly involved aboriginal participation, not only in identifying new protected areas, but also having representation on the committee that provides management direction for the area. This initiative has been undertaken by means of collaborative management agreements (CMAs). These agreements are not the outcome of new national legislation, nor are they a consequence of a recently negotiated treaty. Government and First Nation representatives, as a result of sharing a conviction that action was required to protect land, water, and wildlife, freely enter into a CMA to actively discuss protection of pristine landscapes and advancement of biodiversity goals.

Value of Collaborative Agreements

Considering the historical debates regarding the need for legislated wilderness, the premise that “a joint statement of intent with a dash of collective goodwill” is sufficient to ensure protection of wildland deserves close scrutiny. Such agreements seldom have the force of law behind them, so they raise several questions:

1. Why would government officials support an initiative to create collaborative agreements?
2. What conditions influence the feasibility of this approach to protecting wilderness values?
3. What is the scope of such agreements, what are their characteristics, and what makes them successful?

Are both the conservation and societal expectations associated with wilderness taken into account in such initiatives? Six case studies have been examined and are described to draw general comparisons between them. While the likelihood of success of collaborative agreements may be context specific, there is an emergence of some key practices that can be applied to other jurisdictions.

Are collaborative models suitable for achieving wilderness ideals? Underlying this question is the assumption of defining a specific point of view or whose ideals of wilderness will be the point of reference. Over several decades there have been shifts in the dominant rationale to protect wilderness resources. For conservation biologists, “biodiversity” is touted as the dominant value for wilderness protection (Soulé 1998). For a large number of urban dwellers, however, who do not plan to visit the wilderness, there are distinct personal values of wilderness tied to spiritual, aesthetic, and bequest values inherent in wilderness (BCMOF 1994.) For indigenous people, a relationship with the land is one of kinship and social structure, as their traditional territories represent their livelihood, cultural identity, and well-being. Thus, when considering what is a suitable ideal, the answer may lie in knowing just whose perception of wilderness we are talking about.

Wilderness is fundamentally a social construct that varies in meaning within a population and across cultural boundaries. Collaboration is simply a new way to address issues vital to the construct of wilderness in the increasingly dynamic social and political environment of the northern latitudes. Within any province or territory in Canada, the local social issues associated with wildland are of paramount importance, in spite of recognizing the biodiversity objectives of conservation proponents. In essence, achieving many of the biodiversity goals will be dependent on accommodating different world views on the meaning and significance of wilderness. However, wilderness in terms of cultural identity, personal well-being, and survival can differ greatly under such circumstances, and the resolution of such sociocultural differences will require careful attention to a collaborative process for addressing the issues. According to Minnis and Peyton (1995):

When resource managers work within the limits of ecological parameters, they must solve problems, but when they work within the limits and forces of sociological parameters, they must resolve issues.

The sociological parameters facing wilderness in the Circumpolar North can be seen as the need to recognize and embrace the inherent differences in aboriginal and nonaboriginal world views concerning wilderness and resource management. Perhaps the best way to resolve differences and to create a shared vision is through careful collaboration (Gray 1985, 1989; Pfister and Ewert 1996; Selin and Chavez 1995).

In many ways, the importance of biodiversity representation is not an objective in conflict with the sociocultural objective of involving indigenous people. Essentially, it can be argued that the nature of human presence may be a more complex issue because it requires the integration of distinct world views about what wilderness management should achieve. This challenge to collaboration is relevant in the cross-cultural context of managing natural resources in Finland (Hallikainen 1993; Kajala and Watson 1997), in Alaska (Gallagher 1996), and in the Canadian North (Berkes and others 1991; Witty 1994). As stated by Berkes and others (1991):

...self-management is at the core of social and economic health of many native communities, and is tied to larger questions of self-government. Thus, the cooperative management of resources becomes a key issue...in the implementation of principles of environmentally sustainable, culturally appropriate economic development.

In other words, the long-term success for new wilderness designation is to ensure the aggregated values associated with wilderness are protected, regardless of whether or not biodiversity values dominate over sociocultural values in the process. Of course, it is important to recognize problems associated with efforts to address biodiversity criteria in wilderness designation. Generally, such problems are guided by a scientific paradigm to discover the resolution of the dilemma. On the other hand, defining the character of wilderness, or management practices within it, raises more complex issues when future action involves a world view held by aboriginal people. It is increasingly evident that the rights, privileges, and interests of aboriginal people will play an important part in determining the feasibility of protecting wilderness in the northern latitudes. Thus, a collaborative approach has considerable merit.

What conditions influence the feasibility of collaboration? There will be a need in the Circumpolar North to consider two general sets of questions about the feasibility of implementing a collaborative model. These pertain to (a) legal-political feasibility and (b) sociocultural feasibility. Some of the basic legal-political questions identified by Borrini-Feyerabend (1996) are:

- Do the laws and regulations have sufficient flexibility to allow for a collaborative decisionmaking body to manage a wildland area?
- Are there planning policies or operational practices in place to address the key management issues and employ a jointly agreed upon conflict resolution process?
- Is there a political willingness to share the responsibilities and obligations of wilderness protection with indigenous representatives whose rights and privileges may be currently defined by customary use of an area?
- Is a partnership likely to strengthen their political capability to ensure the pressures of commercial or industrial exploitation can be more effectively resisted in special places and sensitive areas?

The sociocultural feasibility relates to adopting practices that can value the differences between aboriginal and nonaboriginal culture. What one group may call wilderness, the other group may call home to a way of life. The type of questions that may assist the prospective collaborators assess another aspect of feasibility includes:

- Are the partners informed and knowledgeable about the threats to an area as well as the potential trials and tribulations of collaborating to protect it?
- Are there past practices and trust-building experiences among the partners that can facilitate and support collaborative decisionmaking?
- Are the partners openminded and respectful of different cultural customs, highly tolerant of the ambiguity in the intercultural communication process, and willing to "learn by doing"?
- Are the partners able to agree on a common vision and course of action?

What is the scope and characteristics of collaboration in northern British Columbia? In northern British Columbia, these kinds of feasibility questions have been addressed. Beginning in 1992, there was a political willingness to share the responsibilities and obligations of protecting wild places with First Nations for at least two reasons:

1. The initiative was viewed as a government-to-government discussion.
2. The agreements were seen as an interim step within a broader picture of resolving long-standing disputes over land title and unextinguished aboriginal rights to resources in traditional use areas.

More importantly, the sociocultural questions were answered very positively early in the process, and key elements of the cultural conditions may have a sufficient factor to overcome a variety of other obstacles evident at the inception of the collaborative process. As stated by one participant party to the first collaborative agreement (Murtha 1996):

Despite sometimes profoundly different cultural environments, there can be common interests in respect for the natural world, in resource conservation, in sustainability, in sharing knowledge with visitors, in celebrating diversity, in preserving areas from industrial and social impacts for their inherent values, and in employing time-proven resource management techniques. It is these common interests which are providing the foundation for new management partnerships in many parts of the world. In fact, it is no longer unusual for a native society to approach a park agency such as B.C. Parks with a partnership proposal. Translating the ideals and the enthusiasm into a successful reality requires creativity, sensitivity, patience, innovation, and perhaps even imaginative interpretation of rules. A fundamental requirement is a recognition that it is not primarily a technical issue but an attitudinal one—how to accommodate two world views.

The model of collaboration in British Columbia over the years has resulted in a half-dozen signed agreements to protect wilderness values. There have been various examples, like the above-referenced quote, that illustrate the relevance of intercultural communication skills on the part of those individuals negotiating such agreements (Pfister 2000). By joint agreement, six areas covered by agreements were labeled whatever seemed most appropriate—a sanctuary, heritage conservancy area, or memorial park. While one legislative framework (such as, Parks Act) in British Columbia does not have a “wilderness” designation category, it does have policies for establishing wilderness conservation and wilderness recreation zones. Agreements between protected area officials and aboriginal representatives vary according to the circumstances of partners and place, and yet the agreements are essential first steps in a continuing process to establish policies and practices that will protect wilderness character and recognize the importance of an area to the heritage, cultural identity, and well-being of an aboriginal community.

Six recent agreements, from 1992 to 1996, were not prescribed by a treaty process but entered into as a way to accomplish biodiversity goals, empower aboriginal settlements to realize local benefits from protected areas, and to establish a set of management activities that could be implemented through collaborative relationships. Each of the case studies have unique histories in terms of aboriginal heritage, claims, and traditional uses. They include: Gwaii Haanas National Park Reserve (Queen Charlotte Islands), Kitlope Wilderness Conservancy, Anhluut’ukwsim Laxmihl Angwinga’asanskwhl (or Nisga’a Memorial Lava Beds Park), and Khutzeymateen Grizzly Sanctuary and Tatshenshini-Elsek park. Table 1 provides information on four common attributes for each area: (1) activities covered in the Terms of Reference, (2) governance and representation, (3) style of decisionmaking, and (4) special features related to management and integration of western scientific approaches and traditional ecological knowledge of native communities.

In each of the six agreements, the Collaborative Management Committees (CMCs) are co-chaired and take action on items that reach consensus rather than the majority-rule standard. In the last two committees to be established, allowance was made for a majority-rule provision when certain conditions arise. Each of the CMCs have very broad and encompassing authority to manage public and commercial uses, as well as resource protection. All CMCs report to be functioning fine under the Memorandums of Understanding that they have signed, and have been able to advance the goals of the management plans for their respective areas. In terms of the special character of the wildland area, table 2 reveals how important biodiversity objectives have been captured in the establishment of the area. It is important to recognize that these areas would not be protected if the collaborative process had failed to reach agreement and establish working CMCs.

Table 1—Collaborative Agreements in British Columbia.

Park	Year signed	Activities covered by Term of Reference	Committee or membership structure	Chair	Decisionmaking style	Special components of the Agreement
Nisga'a Lava Beds Memorial Park	1992	Establishment Planning Development Adjacent land issues Park use permits Operations and development Research Publications Interpretation Planning Operations Management	Open ^a	Cochairs	Consensus	
Gwaii Haanas National Park Reserve	1993		Two Government of Canada Representatives, Two Council of Haida Nation Representatives	Cochairs	Consensus	
Khutzeymateen Grizzly Sanctuary	1994	Management of park resources with highest priority given to the grizzly bear population Maintenance of traditional territories Cultural sites Administration Management Park Plan	One Tribal Spokesman for Stewardship, One District Manager for BC Parks ^b	Cochairs	Consensus	Both traditional (native) and scientific knowledge are considered in the management decisions.
Ts'il os Provincial Park	1994		Three Representatives from the Xeni Gwet'in Chief, councilors, and liaison with three BC Parks Representatives	Cochairs	Consensus	Parties will "work together in a spirit of cooperation, respect, and friendship, and to develop a long-term working relationship."
Kitlope Heritage Conservancy	1996	Planning Operations Park use permits Research Publications Interpretation	Three Representatives from the Haisla Nation, three Representatives of BC government, third-party Chair ^c	Mutually selected	Consensus with special provisions ^d	Park established by Order-in-Council under the Environment and Land Use Act ^e .
Tatshenshini-Alsek Park	1996	Planning Management/operations Capital development Use permits/contracts Fish/wildlife harvest Research and publications Interpretation	Two Representatives of the Champagne and Aishihik First Nation, Two Representatives from BC government	Cochairs	Consensus with special provisions ^d	Provisions to facilitate the assumption of operations by Champagne-Aishihik First Nation.

^aTerms of Reference for membership does not specify number of representatives from the Nisga'a Tribal Council or BC Parks. The committee prefers informality, values continuity of representation, and enjoys a high level of trust among participants.

^bGits'iis Tribe entered into the agreement to ensure that the grizzly bears and their habitat was the highest priority of resource management and both parties would work together in the "spirit of cooperation, respect, and friendship."

^cBoard by mutual agreement selects a third-party chair that brings an independent view to the board. Currently the chair of the board is a highly regarded ex-politician who has served as Speaker of the House of Commons. Three representatives can be appointed by the BC government.

^dKitlope provisions allow for majority vote in special circumstances, and Tatshenshini-Alsek includes dispute resolution procedures in the absence of consensus. Consultation is to occur in the event the provincial minister chooses to "vary, replace, or set aside a consensus decision" of the committee. Gits'iis Tribe entered into the agreement to ensure that the grizzly bears and their habitat was the highest priority of resource management and both parties would work together in the "spirit of cooperation, respect, and friendship."

^eThe O.I.C. action authorizes the Minister to recognize a comanaged heritage "conservancy," as opposed to a park. The Park designation, which would be more restrictive, was not preferred by the Haisla Nation in establishing this protected area.

Table 2—Description of conservation values and First Nation benefits resulting from collaboration

Park	Conservation values protected within area	Local First Nation benefits
Kitlope Heritage Conservancy	Protects a representation of the Kitimat Ranges Ecoregion and is significant because it fully protects a large intact primary watershed, from glacier to saltwater, together with an excellent representation of coastal temperate rain forest ecology. Kitlope is "typical" in that it supports most species given what is known about northern coastal habitats. Due to the unusually large size (322,000 ha) of the pristine area, it is very significant in terms of biodiversity and other ecological considerations.	Nanaklia Insitute (Haisla) is contracted to manage the area and has hired five Haisla people in Watchmen positions. While only several years old, the board has constructed a base cabin to provide an HQ facility for the watchmen. Four ecotour companies were granted permits to operate in the area in early 1997. Most companies have been based from large sailboats anchored off the Kitlope estuary. In addition, permits have been issued for four guided sport fishing operators and one hunting guide. In 1991, the Haisla Nation opened a Rediscovery Camp for cultural awareness and to build skills and teach self-confidence among native and nonnative youth.
Ts'il os	Protects over 233,000 hectares of undeveloped wilderness and a representation of the Central Chilcoot Ranges Ecoregion. The park's special features include Mt. Tailow, Chilko Lake, Tchaikazan Valley with five glaciers—the largest of which is the only major glacier on the leeward side of the Coast Range. The transition area between the Coast Mountains and the interior plateau includes five of the province's 14 biogeoclimatic zones as well as various sacred, cultural, and spiritual sites of significance to the Xeni Gwet'in people.	The Xeni Gwet'in are seeking to sustain the community of Nemiah Valley through the use and management of the land. Activities they undertake include fishing, trapping, hunting, ranching, and guiding activities. The recruitment, training, and selection of band members to serve as back-country staff is one of the goals of the plan. The management plan makes reference to the role of private sector advertising in fulfilling the visitors' back-country expectations and makes reference to a set of steps similar to a code of conduct set for nature operators.
Gwaii Haanas Heritage Reserve	Protects 138 islands and marine habitat in the southern part of Haida Gwaii/Queen Charlotte Islands. Area contains Ninisims, a World Heritage Site, with the world's finest display of Haida mortuary poles. Five other historic Haida villages are also protected along with 25,000 km of shoreline that serve as nesting, breeding, and feeding grounds for a diverse population of marine sea life (such as whales, Steller's sea lions, and seals) and dozens of species of seabirds migrating along the Pacific flyway.	Joint strategies have been adopted to assist the Haida to take advantage of the economic and employment opportunities associated with the management of the area. The Haida Gwaii "Watchmen" serve as guardians at five heritage village sites and ensure protection of the natural and heritage values by providing information on Leave-No-Trace techniques for wilderness visitors.
Nisga'a Lava Bed Memorial Park	Protects a representation of Nass Basin and Nass Range Ecosystem. Special features are the fragile volcanic cone and related lava features throughout the park. Park serves as a memorial to over 2,000 Nisga'a who were killed by the eruption. Cultural features include historic Nisga'a villages and supernatural sites. It is intended this Park will be a "flagship" attraction for the provincial park system in the northwest region of BC and complement other aboriginal attractions in the area.	Nisga'a First Nation people are employed as wardens and serve as hosts at the newly opened visitor center. Travel in the backcountry requires a Nisga'a guide for a nominal fee. Visitors can enjoy both the unique volcanic landscape and the aboriginal heritage tied to the language, totems, and ceremony of the Nisga'a.
Klutzeumateen Grizzly Sanctuary	Protects an exceptional representation of a rare ecological system containing a Sitka Spruce rainforest, a productive coastal estuary, a dense grizzly bear population, and a rich salmon river. The 44,272-ha area protects one of the last stands of old growth Sitka rainforests with some of the trees up to 800 years old. The watershed is critical habitat for northern coastal grizzly bears, and has one of the densest concentrations of grizzly bears in British Columbia. Thus, it is an important benchmark for scientific research. The area is also included in the traditional lands of the Gits'iis people—one of the nine tribes making up the Allied Tsimshian Tribes. Each Gits'iis house has stewardship over specific territories that are linked to a wealth of sustenance rights and cultural privileges such as names, crests, dances, and songs.	Gits'iis state that the land has spiritual significance to their people and has provided them with food, medicine, transportation, shelter, and the raw materials for art and cultural items, which is good for trade and barter. They respect the value of the area for grizzly bears and wish to practice traditional activities that do not impact the bears, including not hunting bears. The Gits'iis have never hunted grizzly bears and believe that the soul of a person that died may reincarnate into a bear. Thus, they would never hunt bear for food or sport. The area is managed in accordance with traditional law, and any use other than that allowed by government permit must be referred to the hereditary chief prior to issue.

(con.)

Table 2—Con.

Park	Conservation values protected within area	Local First Nation benefits
Tatshenshini-Atsek	<p>Protects 9,455 square kilometers of wilderness in the northeast corner of BC, and it has been designated as a World Heritage site. The designation recognizes the global significance of the area, and the adjacent protected areas in Alaska and Yukon formed the largest contiguous protected area and world heritage site in the world. It is highly valued as a wilderness rafting destination and renowned for its outstanding wilderness qualities—spectacular mountains, massive glaciers, wild rivers, precipitous canyons and forest valleys with bears, Dall sheep, eagles, and Pacific salmon. It is the only protected area in British Columbia to contain an entire intact ecoregion—The Icefield Range Ecosystem. Also located in the area is Mt. Fairweather, BC's highest peak, and the Province's only tidewater glacier—Grand Pacific Glacier at Tarr Inlet. A diversity of threatened or endangered birds are found within the area.</p>	<p>The Tatshenshini-Atsek is part of the traditional territory of the Champagne and Aishihik First Nations. Their traditional economy is based on hunting, fishing, gathering, trapping, and trading, which continue to be practiced within the area. The cultural heritage resources are not well known. While some work has been done on early fishing villages, many First Nations caches, campsites, petroglyphs, trail markers, and cabins remain to be located. First Nations reserve rights to provide tours associated with the outstanding wilderness recreation activities, including two of the world's finest river rafting experiences, guided hunting and angling, wildlife viewing, scenic vistas, and the potential for cultural tourism.</p>

Conclusions

After reviewing the agreements and talking with the parties involved, there are four general conclusions evident:

1. Protecting and managing for wilderness values in the northern latitudes will be more successful when political/institutional and sociocultural feasibility of a collaborative process has been assessed and incorporated into planning.
2. Implementation of a collaborative agreement has a higher degree of success when participants are willing to think “outside the box” of past practices. For example, policies and practices of protection must recognize that aboriginal relationships and rights are essential for aboriginal livelihood and cultural survival.
3. Areas examined vary noticeably in terms of habitat and wilderness character protected within their boundaries.
4. Collaborative models adopted and implemented in British Columbia are at the embryonic stage of their evolution, but they do illustrate what can be accomplished in the absence of a specific “wilderness act” of the type found in other North American jurisdictions.

Thus, the innovative frameworks for collaborating for protection and management of wildland in British Columbia are showing promise for accommodating aboriginal and nonaboriginal world views of wilderness. The collaboration models will vary in terms of structure, representation, and range of issues that are considered. But in each case trust has been built among partners so that there can be enduring working relationships on the CMCs. Perhaps the lessons learned in these situations can stimulate participants in other jurisdictions to be creative and innovative in collaborating across cultural boundaries for the benefit of the scientific and human values associated with wilderness protection and management.

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Planning in the Human Ecotone: Managing Wild Places on the Togiak National Wildlife Refuge

Stewart Allen

*Change, meaningful change,
almost always comes from
the edge, the margin.*

Paul Hawken

Abstract—The U.S. Fish and Wildlife Service is revising the long-range plan for Alaska's Togiak National Wildlife Refuge, over half of which is designated as the Togiak Wilderness Area. Many of the planning issues are social rather than biological, involving public use and its effects on Refuge resources and opportunities. Planners, managers, and stakeholders are finding themselves in the human ecotone, where two or more legal, social, and cultural edges intersect to produce an abundance and diversity of conflicts, challenges, and opportunities. Planning in the human ecotone requires collaboration, up-to-date information, and an adaptive process.

Introduction

Located in remote southwest Alaska, the Togiak National Wildlife Refuge comprises 4.3 million acres between Kuskokwim Bay and Bristol Bay. Congress established the Refuge in 1980 under the Alaska National Interest Lands Conservation Act, which not only greatly expanded an existing refuge but designated just over half of the new refuge as the Togiak Wilderness Area—the second largest Wilderness in the entire Refuge System (fig. 1). The Alaska National Interest Lands Conservation Act directed the U.S. Fish and Wildlife Service to develop a long-range Comprehensive Conservation Plan for the area, which was published in 1987.

In 2000, the U.S. Fish and Wildlife Service began revising the original plan, taking into account new information, resource conditions, and public uses. We found ourselves operating at the edge of many social, cultural, and legal boundaries—the human ecotone. This required us to create not just a new plan, but a new process for developing it. The process is far from over, but we have already learned several valuable lessons.

Togiak National Wildlife Refuge

The Alaska National Interest Lands Conservation Act specified four purposes of the Togiak Refuge to provide the U.S. Fish and Wildlife Service with management direction and priorities:

1. Protect fish and wildlife habitat and populations in their natural diversity.
2. Fulfill international treaty obligations.
3. Provide opportunity for continued subsistence uses by local residents (consistent with first two purposes).
4. Ensure water quality and necessary water quantity.

These four purposes parallel those of other Refuges established by the Alaska National Interest Lands Conservation Act, as well as reflecting the mission of the National Wildlife Refuge System, which currently contains 536 Refuges nationwide. The System's mantra, "Wildlife First," demonstrates that refuges are not intended to be multiple-use lands that cater to a wide range of uses and values. Instead, the focus is on habitat for fish and wildlife.

In fact, refuges in the lower 48 States are closed to human use until they are specifically opened, and then there is a careful analysis of the type, amount, timing, and location of human use that is compatible with refuge purposes before any use can be allowed. In Alaska, refuges are open to human use until closed—a recognition of the long tradition of subsistence and other human uses that began thousands of

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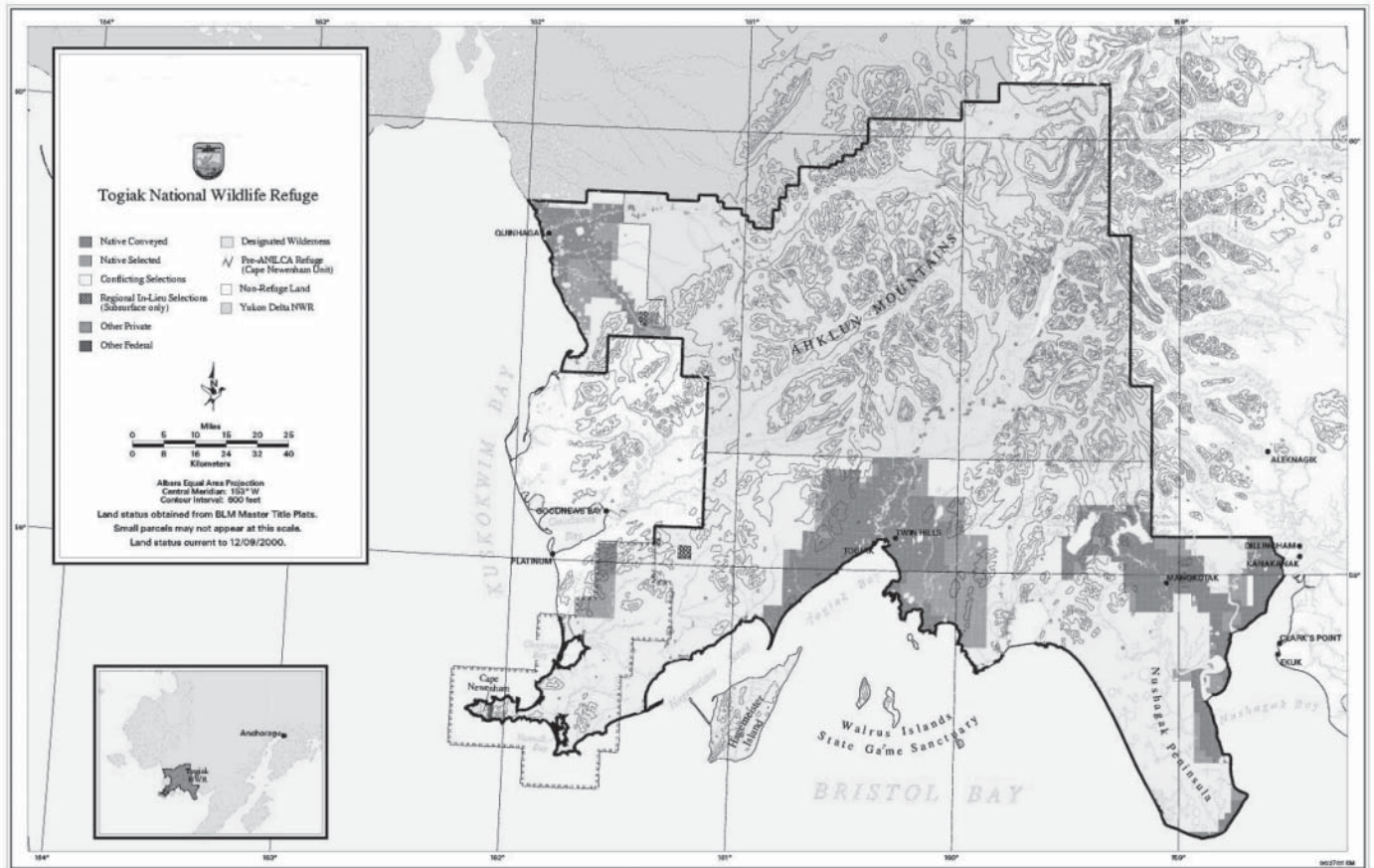


Figure 1—Togiak National Wildlife Refuge.

years before the refuges were established—but use must still be compatible with protection of habitat and other purposes.

The seven predominantly Native villages located within or near the Togiak Refuge, with a population totaling about 2,000, rely heavily on the Refuge for subsistence. The primary subsistence use is fishing, supplemented by hunting, berry picking, firewood gathering, and other activities. The Refuge provides outstanding habitat for fish populations, including substantial runs of king and silver salmon, as well as resident species such as grayling and trout.

Several additional management goals for the Togiak Refuge and other system units have been established through policy and legislation. The Refuge Improvement Act of 1997 directed that refuges should provide opportunities for compatible recreation, with a priority on wildlife-dependent recreational use. Another goal is to manage the Togiak Wilderness to achieve objectives of the Wilderness Act as modified by the Alaska National Interest Lands Conservation Act.

Recreational use consists mainly of sport fishing, centered on the Kanektok, Goodnews, and Togiak Rivers, all accessed by air. People from across the country, as well as many foreign visitors, come to the rivers. Traditionally, people used the services of guides and outfitters allowed to take clients on the Refuge through special use permits, but more people today are coming on their own. Guided and nonguided visitors access fishing areas by both motorized and nonmotorized boats. Like many wild places in Alaska, the Togiak Refuge has experienced dramatic increases in use levels over the years, although Refuge limits on guided use established in the early 1990s slowed this trend, and use has decreased slightly in some areas over the past few years. Demand for wildlife viewing is increasing, especially the opportunity to view marine mammals and seabird colonies at Cape Peirce, one of a handful of primary walrus haulouts in Alaska.

Early in the plan revision process, we asked people what they valued about the Refuge and its resources. The most frequent responses were “wilderness character” and “environment,” followed by “fish” and “fishing opportunities,” “ecosystem protection,” and “wildlife.” When asked if people believed these values were threatened, most people said they were not, but among the threats listed, “increasing human use” and “crowding and conflicts” between and among sport and subsistence users predominated.

Many planning issues have been identified through the public process required by the National Environmental Policy Act. Identifying issues is especially important for a plan revision because many aspects of managing the Refuge are working fine and do not need to be revised—just updated based on new information. It is therefore important to specify the key issues to focus development and analysis of alternative management directions.

Here are the issues that we are exploring as we revise the plan. These are just the tip of the iceberg; a 45-page report describes each in detail:

Water quality—What is the current status of water quality on the Refuge? What is the Refuge’s role in improving or maintaining water quality? What is the effect of human use on water quality, especially in the Kanektok River?

Health of fish—Are fish stocks healthy? What are the impacts to spawning areas from public use, trampling by anglers, and boats with jet units? What is the effect of catch-and-release fishing on fish mortality? How can the Refuge minimize the risks of introduction of whirling disease or other parasites that could infect fish populations?

Subsistence opportunities—How should the Refuge define and manage for quality subsistence opportunities? How will the Refuge know if subsistence uses are declining in quality or becoming significantly restricted? What are the main influences on subsistence on the three main river systems? How is increasing recreational use of the three main river systems affecting subsistence uses?

Recreation quality—How do visitors and the Refuge define a high quality recreational experience, and is that experience being provided on the Refuge? What resource and social conditions are desirable to provide high quality experiences, and what are the threats to recreational opportunities? What should be the Refuge’s role in defining and managing for quality experiences on the Kanektok, Goodnews, and Togiak Rivers?

Impacts of public use on wildlife in the river corridors—Under what conditions are game species displaced from river corridors during hunting season? What can the Refuge do to minimize effects on subsistence hunting? Under what conditions are bears attracted to human camps along the rivers? What can the Refuge do to minimize the effects of bears on fishing camps and villages, and on recreational visitors?

Management of human use and wildlife at Cape Peirce—How can the Refuge protect marine mammals and other species that depend on Cape Peirce, while providing opportunities for public use?

Possible new land management designations—What lands, if any, should the plan recommend for designation as wilderness? Where and how would additional wilderness help the Refuge to better achieve its purposes? What effects would additional wilderness designation have on human uses and administration of the Refuge? What river segments are eligible for designation as Wild and Scenic Rivers, and which, if any, should the plan recommend? How would Wild and Scenic River designation help the Refuge better achieve its purposes, and what effects would it have on human uses?

Human Ecotone

As we began revising the Togiak Refuge’s long-range plan, we realized that we were confronting a variety of social, legal, and cultural boundaries. We found it useful to think of these boundaries as forming a set of human ecotones, borrowing a term from ecology. An ecotone is generally known as a transition zone between two

ecosystems such as coniferous forest and tundra, where two or more different communities meet and interact. Ecotones tend to be places of species abundance and diversity.

The human ecotone is the interface of institutional, legal, and cultural boundaries. It is also an area of great diversity and abundance—not necessarily of species, but of ideas, planning challenges, and opportunities. Planning in the human ecotone requires recognition of these edges and boundaries, and careful consideration of how to incorporate them. From the many we have identified, I'll focus on three: (1) institutional edges, (2) legal edges, and (3) cultural edges.

Institutional Edges

Although the U.S. Fish and Wildlife Service is responsible for protection of resources and opportunities on the Togiak Refuge, it does not have the authority to manage all of the lands and uses that affect the Refuge. Many private lands lie within the Refuge boundaries. Most are owned by Native corporations created by the Alaska Native Claims Settlement Act or are allotments managed by individual landowners. These lands are not subject to Refuge regulations and can be developed, leased, or sold.

Downstream from the Wilderness boundary on the Kanektok River, for example, the entire river corridor is privately owned by the Native Corporation, which allows several guiding businesses to operate seasonal lodges. These businesses do not need a special use permit from the Togiak Refuge unless they take clients upstream to lands within the Wilderness boundary. The Refuge therefore has little control over conditions along the lower river, which Refuge visitors encounter when they progress downstream to the village of Quinhagak (from where nearly all visitors fly out at the end of their trip). The fishing for king salmon, which draws many anglers to the river, tends to be the best along this lower stretch. This leaves the Refuge in the position of not being able to manage one of the key aspects of peoples' experiences. Fishing regulations are the responsibility of the State of Alaska, further removing the U.S. Fish and Wildlife Service from the picture. Shorelands of the river, where most people camp on the abundant gravel bars, are managed by the State's Department of Natural Resources.

Although the U.S. Fish and Wildlife Service works closely with the State and with the Native Corporation, there is often disagreement over management of lands and waters. The State of Alaska has its own set of laws and policies, such as equal access for all residents, and does not support the Federal rural preference for subsistence users. The State also tends not to support limits on recreational use to protect recreational quality, one important tool available to Federal managers. The Federal government has mandates to provide rural preference and to maintain recreational quality, which includes uncrowded conditions.

Legal Edges

The U.S. Fish and Wildlife Service faces a key legal edge, where two laws butt up against one another, in managing the Togiak Wilderness Area. The Wilderness Act provides national direction for managing the Togiak Wilderness as "untrammelled," where people are viewed as temporary visitors to a largely unaffected landscape. Alaska National Interest Lands Conservation Act provides Alaska-specific direction for managing the Togiak Wilderness as a living, working landscape where people are part of the ecosystem, allowing for traditional motorized uses, travel to and from home sites, and other uses not typically found in Wilderness. Refuge managers and other Federal land management agencies like the National Park Service and the U.S. Forest Service struggle with how to protect wilderness values and character while providing required access.

In addition to the designated Wilderness, the Refuge contains 334,000 acres recommended for designation by the original plan. Under the Alaska National Interest Lands Conservation Act, the Refuge manages these lands not as wilderness study areas, but simply as part of the Refuge without special measures to maintain wilderness character other than the same management present on other portions of

the Refuge. Congress has not yet acted on the recommendation, and is not expected to in the near future.

Ordinarily, this would be a dormant issue. However, as part of the Togiak Refuge plan revision, we are required to evaluate the existing wilderness recommendation and determine whether it should be left the same, decreased, or increased. At this point, the evaluation becomes a central planning issue because of the emotional reaction and controversy accompanying discussions about wilderness.

We are also required by law to evaluate rivers on the Refuge for possible inclusion in the national Wild and Scenic Rivers System. This System is designed to balance dams and river development projects, and their many effects on American rivers, with a means of protecting the free-flowing values and outstanding resources present on other rivers. As is the case with Wilderness, the plan itself cannot designate rivers, only recommend designation to Congress, which is under no obligation to take action.

Under the Wild and Scenic Rivers Act, rivers and their corridors (which average one-half mile on each side of the river in Alaska) are first evaluated for their eligibility—whether they possess values that would make them worthy additions to the system. To be eligible, rivers must be free flowing and their corridors must contain one or more “outstandingly remarkable” values, such as recreation, geology, cultural, fish and wildlife, scenery, or hydrology. Rivers found to be eligible are then evaluated for their suitability—whether eligible rivers should actually be recommended for addition to the system. This analysis is more political, taking into account factors such as the costs and benefits to society of designating the river, and local, regional, and national support (or opposition) regarding designation.

The Alaska National Interest Lands Conservation Act did not add any rivers on the Togiak Refuge to the system, but mandated study of the Kanektok. The study found that the Kanektok was certainly eligible but not suitable, due primarily to the lack of support for designation evident in Quinhagak, by the State of Alaska, and within the U.S. Fish and Wildlife Service. Given the previous lack of support, the mandate to evaluate Refuge rivers for Federal designation turns another latent issue into a controversial one.

Cultural Edges

Use of the Kanektok, Goodnews, and Togiak Rivers by local subsistence users and visiting recreational anglers has resulted in a variety of conflicts, particularly on the Kanektok, which initially attracted the greatest levels of visitors. These conflicts have taken many forms, ranging from direct confrontations on the river, which have become less frequent over the years, to less-observable clashes over cultural values.

As suggested by the description of planning issues, locals view nonlocals as having a variety of impacts to subsistence uses and resources. On the Goodnews River, safety is a primary concern, given several near misses and a recent collision between the small, low-powered skiffs used by villagers and larger, high-powered boats used by guides. On the Togiak, there is often competition for a particular stretch of river where king salmon congregate. State law prohibits sport angling at sites where a subsistence set net is in use, but does not address the situation where villagers coming upriver find their preferred site already being fished by recreational visitors. In such cases, the locals typically will continue upriver, and recreational users will not even be aware that they have displaced local use.

The most prominent and well-documented cultural edge is probably the disparate views of catch-and-release fishing, which is the method practiced by nearly all Refuge recreational visitors. Catch-and-release fishing is either a conservation practice or an ethical transgression. Recreational anglers who practice catch and release are trying to enjoy their activity while minimizing impacts to fish populations. In local culture, however, the practice is aberrant and disturbing—playing with food.

After listening to a protracted discussion about recreational quality, one local resident exclaimed, “Recreation quality—that’s what I always hear about. What about subsistence quality?” Protection of subsistence resources and opportunities can be addressed from the standpoint of quality, as well as being a legal mandate.

Revising the Comprehensive Conservation Plan

We have discovered that planning in the human ecotone requires paying careful attention to several aspects of the planning process:

1. Collaborating with others who have management responsibilities for resources and opportunities associated with the Refuge.
2. Basing analyses on the best available data, including social and biological information collected through scientific and local knowledge methods.
3. Adopting a flexible and adaptive approach to both developing the plan and making it happen.

Collaboration

The group of people developing the new plan consists not just of Refuge managers, but of local residents from six villages and representatives from the two State agencies that manage lands and resources on the Refuge (the Department of Natural Resources and the Department of Fish and Game). The group meets face-to-face regularly, getting used to each others' values, perspectives on the issues, participation styles, and areas of knowledge. Meetings provide an opportunity to share information and knowledge about aspects of the Refuge that people value.

Throughout the planning process, we focus on the Refuge's roles and responsibilities in addressing issues and taking actions, and how this fits within the bigger picture. The issues identified so far can not be "solved" by the U.S. Fish and Wildlife Service alone because we don't have the authority to address every facet of the problems or opportunities. The roles and responsibilities of others having authority for various aspects of the issue are identified explicitly.

For example, if the issue is water quality in the Kanektok, there are things that the Refuge can do to help measure, maintain, or improve water conditions—this is one of the Refuge purposes, after all. But the State also has a role, as does the village of Quinhagak, the Native Corporation, and other agencies such as the Environmental Protection Agency.

The advantage of this approach is that it plays to the strengths of the collaborative planning process, turning the institutional edge from a potential liability into an asset. The Refuge doesn't just say "that's someone else's responsibility." The Comprehensive Conservation Plan revision focuses on what the Refuge will do, but references and incorporates the actions that others are already taking or plan to undertake in the future. This allows us to seek collective solutions across institutions and cultures.

As another example, we have spent a great deal of time on Wild and Scenic Rivers, letting stakeholders know what has happened on other rivers, and how river planning is done. As a result, Wild and Scenic River study is viewed by many as a forum for better communication and management for entire watersheds, again bridging legal and institutional boundaries.

Science-Based Decisions

In the human ecotone, it is necessary to muster all of the available information to address the issues, including collection of primary data specifically for the plan. It is a given that all the parties involved may not agree on how the Refuge should be managed, but we would like to begin with a set of data and local knowledge that everyone agrees is useful.

The importance of primary data specific to the Refuge and issues cannot be overstated. For example, preserving water quality is one of the purposes for which the Togiak Refuge was established. Water quality is not just a concern for fish and

wildlife; people who live near the Refuge also depend on high quality river water for household use. Visitors also depend on and highly value water quality. There is concern that improperly disposed human waste from Refuge visitors and others may be contributing to contamination of waters within the Togiak Refuge.

Although there is concern about conditions on all three rivers, most attention has centered on the Kanektok, which has the highest use levels. It is also accepted that the Refuge exerts the greatest control over uses and conditions above the Wilderness boundary. This summer, we have begun a testing program that samples water on the Kanektok as it leaves the Wilderness boundary. Sampling regularly throughout the summer will allow us to compare bacteria levels at various levels of public use in the river corridor. The results may be difficult to interpret because humans are not the only source of fecal coliform that ends up in the river, but they will let us know whether there is a problem.

The planning team member's comment about subsistence quality led us to conduct a study of subsistence users in the local villages to better understand the dimensions of quality for subsistence use of the river corridors. The study identified conflicts with subsistence quality so the planning team can pinpoint areas of concern. The qualitative study is capturing many local viewpoints and much knowledge about the river corridors.

We are also replicating and extending a 1995 survey of recreational visitors to the three river drainages (Kanektok, Togiak, and Goodnews). The results will provide the planning team with a representative view of river visitors, including their experiences, evaluations of river conditions, and attitudes toward possible management actions. Having current information that addresses the planning issues will allow the planning team to collectively learn more about the Refuge and how it is seen and used from diverse perspectives. The result should be a plan that is more sensitive to a range of values and uses.

Flexibility

Finally, we have learned that planning in the human ecotone requires a flexible and adaptive process. We must adapt the planning issues to not just focus on the Refuge's needs, but on the needs of those around us because the Refuge is just one piece of a social and biological system. We must remain open to collecting new information as new issues emerge or old ones transform through new information and collaboration. We must be flexible in our timeframe, because it is unreasonable to expect everyone to progress based only on the agency's agenda and deadlines. Finally, we must even be flexible in our meetings—not one of which has occurred as planned due to the weather and the charter flights required to bring people from the far-flung villages. We have made sure that the U.S. Fish and Wildlife Service decisionmakers are aware of these considerations and of the consequences of ignoring them. As a result, work on the plan revision is proceeding smoothly.

Conclusions

In some ways, every planning effort takes place in the human ecotone. Public lands in particular have a broad range of constituents who have different ideas about the benefits that should be provided to society. Recognizing and accommodating the institutional, legal, cultural, and other edges present is just as important as recognizing the ecological characteristics of lands and waters. In the end, decisions about public land management are political. This does not mean decisions need not be grounded in the best science and social and biological information available, for they should. The concept of the human ecotone serves to keep us aware of the social context of resource planning and management, and of the opportunities and pitfalls that await us.

Nature and Tourism in Greenland

Berit C. Kaae

Abstract—This paper provides a short summary on the development of tourism in Greenland, the cultural context, and the protection of the nature resources on which tourism heavily depends. Existing research projects related to tourism in Greenland and the focus of these projects are briefly summarized. In general, most research in Greenland focuses on natural resources, but tourism is emerging as a prioritized topic. Existing research on tourism in Greenland has some shortcomings in content and structure. It is suggested that more integrated, cross-disciplinary research on tourism and its relation to nature and culture in Greenland be undertaken, and that Circumpolar cooperation be increased to strengthen the exchange of ideas, methods, and comparable results.

Introduction

Greenland or Kalallit Nunaat—The Land of the People—is the world's largest island (2,166,086 km²), but only 410,449 km² (19 percent) of the land is not covered by ice. Greenland has a population of 56,124 (January 1st, 2000, Statistics Greenland 2001a), mostly Inuit and some Danes. Most of the population (81 percent) now live in the towns, while 19 percent live in villages or stations (Statistics Greenland 2001a). The Inuit culture has traditionally been closely linked to the unique Arctic nature and climatic conditions, but has for some decades been undergoing major transitions to meet the challenges of the postmodern global world. Since the Greenland Home Rule Government was established in 1979, the country has gradually been building up its own capacities and institutions while maintaining strong ties and economic support from Denmark.

Tourism Trends in Greenland

Interest in tourism in Greenland started early. In 1902, Mylius-Erichsen wanted to bring a ship with 100 tourists twice per summer to Greenland from England, but permission was denied. In the 1930s, ships from the United States and France carrying tourists were observed in Greenland, but organized tourist travel to Greenland started in 1959 with a flight from Copenhagen and 1-day tourist flights from Iceland (Thalund 2000). The number of tourists remained quite low, and in 1992 approximately 3,500 tourists visited Greenland.

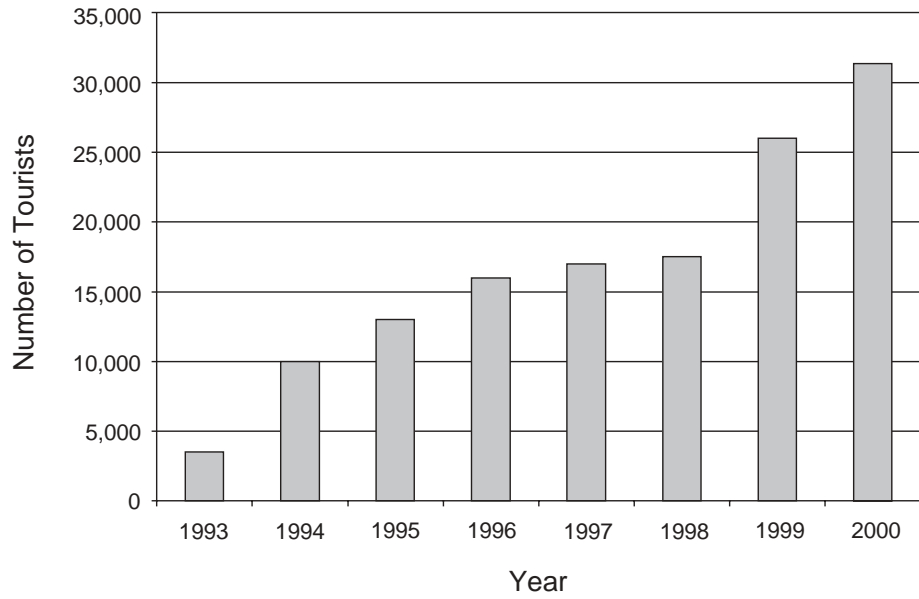
In 1991, tourism became one of three key issues in a commercial development strategy established by the Greenlandic Home Rule Government. The intentions were to supplement income from the declining fishing industry with incomes from minerals and tourism, and substantial public funds were allocated to tourism development. Consequently, Greenland has become an emerging destination for tourists. As seen in figure 1, tourism has grown substantially since the early 1990s, and in 2000 the country had 31,351 tourist arrivals (Statistics Greenland 2001b).

The intention of the Greenlandic Tourism Plan was to increase tourism to 35,000 tourists by 2005, each tourist with an expenditure of 15,000 DKr (approximately 1,800 U.S. dollars), to create 2,200 to 2,500 full-time jobs and 1,000 to 1,500 full-time jobs outside the sector, and to generate an income of 500 million DKr. in Greenland by 2005. Finally, this development had to be environmentally and culturally responsible. Later it was discovered that the expenditure and multiplier effects were set too high, and rather than adjusting the expected benefits, the desired tourist numbers were upgraded to 61,000 by 2005 (Lyck 1998). So far, the expected income and job-generating effects have not been met. In 1997, a report estimated the number of tourists to be 17,000, an increased income of 130 million DKr had been generated, and 220 full-time jobs had been created, but that tourism was heavily subsidized by the government (Lyck 1998).

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Figure 1—Tourists to Greenland from 1993 to 2000 based on estimates from Greenland Tourism (2001a) and Statistics Greenland (2001b).

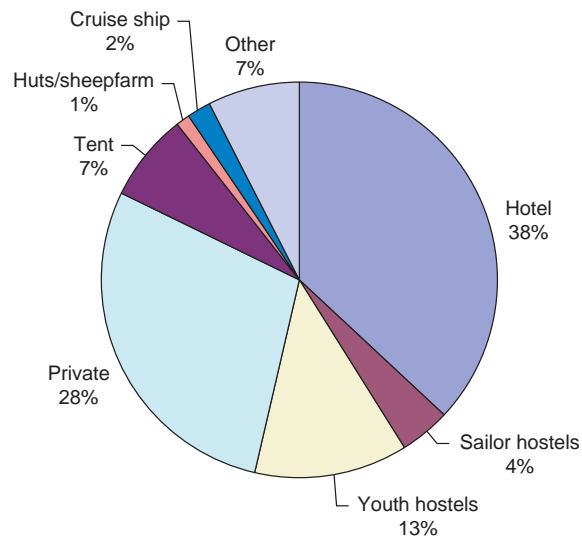


Most tourists in Greenland come from Denmark (79 percent), an additional 8 percent come from other Scandinavian countries, and the remaining 13 percent come from a range of other countries (Greenland Tourism 2001b). Just below one-half of the tourists (46 percent) are on holiday, one-fourth are on business trips (23 percent), 16 percent primarily visit family and friends; and the remaining come to study (4 percent), attend conferences or seminars (5 percent), or participate in other activities (6 percent) (Greenland Tourism 2001b). On average, tourists stay for 15 days, but this varies with the season and purpose of the visit; many of the vacation tourists stay longer.

As seen in figure 2, tourists primarily stay overnight in hotels (38 percent), private homes (28 percent), and youth hostels (13 percent) (Statistics Greenland 2001b). Due to climatic conditions, tourism is highly seasonal with most tourists arriving in July and August (Greenland Tourism 2001b). Tourists tend to be older, with 50 years and older as the dominating group, possibly because of the high price of travel to Greenland.

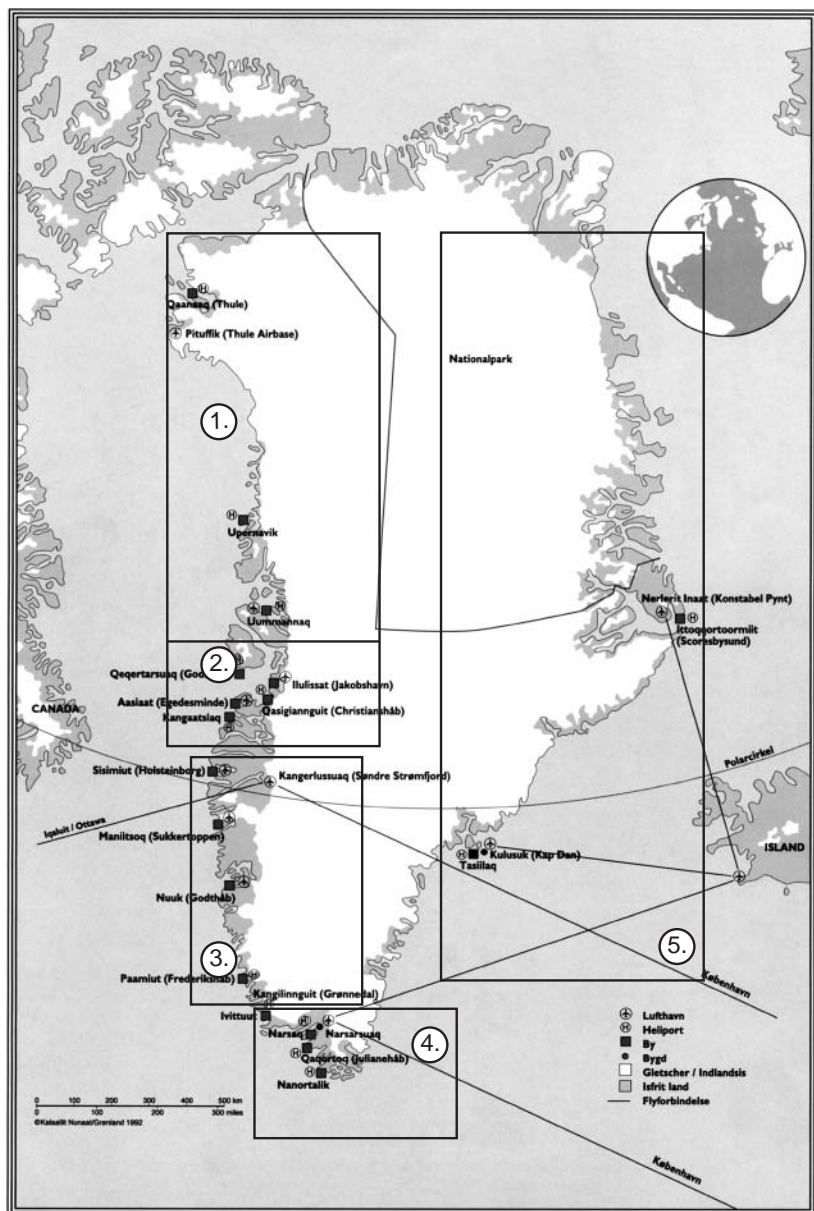
As seen in figure 3, Greenland Tourism divides Greenland into four main regions visited by tourists: (1) North Greenland from Kangaatsiaq and north to Qaanaaq;

Figure 2—Accommodation types used by tourists in Greenland in 2000 (source: Statistics Greenland 2001b).



(2) West Greenland between Sisimut and Paamiut, including the capital of Nuuk; (3) South Greenland between Aappilattoq to Arsuk; and (4) East Greenland from Isortoq to Ittoqqortoormiit, including the National Park. Each region is presented in a separate tourist brochure. Statistics Greenland, however, subdivides the North Greenland region into the popular Disco Bay area near Ilulissat and the more remote northern region.

As seen in figure 4, West Greenland, near the capital, is the most visited area by tourists overall, but among vacation tourists, the Disco Bay area is the most popular visited by 39 percent; 33 percent visit West Greenland; and 22 percent of the vacation tourists visit South Greenland. Only a few go to North Greenland (2 percent) or East



Source: Greenland Tourism 2001; Statistics Greenland 2001
Underlay map reproduced with permission from Greenland Tourism

1. North Greenland (2%)

Attractions

- Nature, flora and fauna
- Inuit hunting culture
- Inaccessible and untouched
- Expeditions, hiking, dogsledding
- Midnight sun

Barriers

- Transport conditions and access
- Military restrictions

2. Disco Bay (29%)

Attractions

- Nature, flora and fauna
- Ice and glaciers
- Midnight sun
- Hiking, boating, dogsledding all year, angling, whale watching
- Handicrafts

Barriers

- Overnight capacity

3. West Greenland (44%)

Attractions

- Nature, flora and fauna
- Nuuk - the capital
- Handicrafts
- Hiking, boating, horseback riding, angling, whale watching, Musk Ox safari, heli-skiing
- Northern lights

Barriers

- Weak area in experiences, activities, and attractions

4. South Greenland (18%)

Attractions

- Nature, flora and fauna, ice fjords
- Sheepfarms, seal hunters, fishing
- Norse history, hiking, boating, climbing, angling, horseback riding, helicopter
- Northern lights
- Hot springs

Barriers

- Ice-locked → short season
- Limited flight access

5. East Greenland (1%)

Attractions

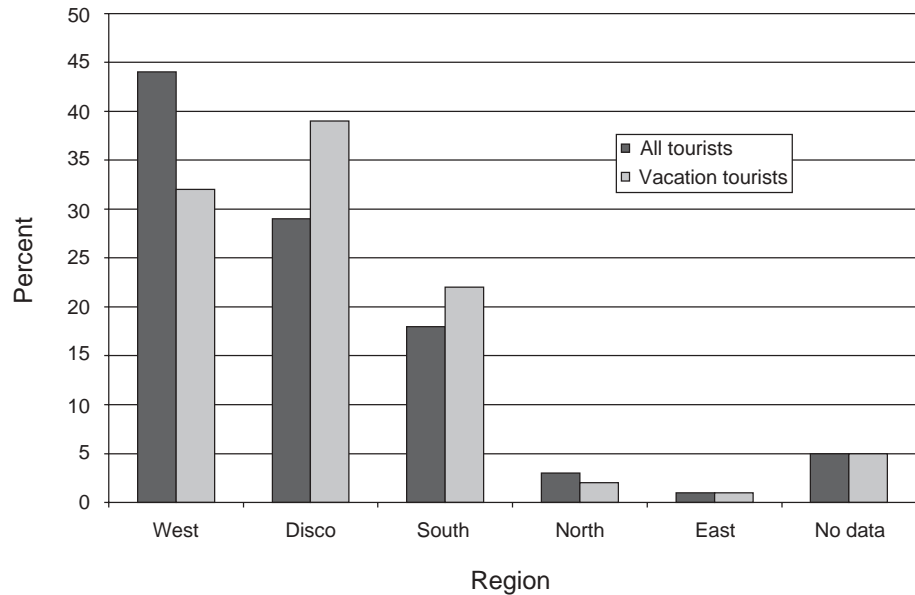
- Nature, flora and fauna, ice
- Hunting and fishing culture
- Hiking, dogsledding, boating, climbing, angling, camping
- Handicrafts
- Northern lights

Barriers

- Overnight capacity
- Product development
- Length of stay
- Helicopter ride a bottleneck

Figure 3—The primary attractions and barriers for tourism in the five tourism regions of Greenland (source: based on information from Lyck 1998, and Statistics Greenland 2001b; underlay map reproduced by permission from Greenland Tourism).

Figure 4—The regional distribution of tourists in Greenland in 2000 subdivided into all tourists and vacation tourists (source: Statistics Greenland 2001b).



Greenland (1 percent), but the low visitation in Eastern Greenland may be due to problems with the data sampling (Statistics Greenland 2001b).

Each of the tourist regions offer a variety of tourist attractions and activities, which all tend to focus strongly on nature qualities and activities in the Arctic nature.

The Role of Nature and “Wilderness” to Tourists

The tourists primarily come to experience the unique arctic nature and the Inuit culture. Given the low population in a vast landscape and the low influence of man on nature in Greenland, some tourists may possibly perceive nature in Greenland as “wilderness”—especially in comparison to the manicured cultural landscapes of Denmark and other countries of origin of tourists. But the term “wilderness” does not seem to appear in tourist brochures or general Danish language, and no classifications such as “wilderness” currently exist in Danish nature classification systems. To the local Inuit population living in “The Land of the People,” the landscape is also not likely to be perceived as “wilderness.” As such, the term “wilderness” is culturally defined and may only be meaningful to some segments of tourists. Consequently, the term “nature” is used throughout this paper.

The nature experiences in tourism in Greenland are oriented toward experiencing the ice and snow, flora and fauna, hiking in the coastal mountains, seeing the midnight sun or the northern lights, dogsledding, sailing along the coast on ferries or cruise ships, kayaking, fishing, and whale watching. It also involves more specialized activities such as rock climbing, mountain biking, heli-skiing, adventure racing, Polar Circle marathon, and ice golf. Cultural experiences include historic remains of the early Inuit and Norse cultures as well as present day culture. The high focus on nature and nature-related activities is strongly reflected in marketing materials such as brochures and elaborate Internet information, representing Greenland to tourists. However, studies of tourist’s (and resident’s) use and perceptions of natural and cultural qualities in Greenland appear to be absent.

Economic studies (Lyck 1998) suggest that in addition to environmental and social costs, tourism has brought an economic net loss to Greenlandic society. The tourism industry is in the process of strengthening its position, but further investigations into the organizational and societal factors influencing tourism development in Greenland is needed.

Cultural Resources in Greenland

Greenland has been inhabited periodically for the past 4,500 years (Grønnow 2000). The Inuit originate from Central Asia, and the first immigrations to Greenland were via Alaska and Canada approximately 2500 B.C. These early settlements consisted of Independence I culture (about 2500 to 1300 B.C.) located in the high arctic in northeast Greenland. Kayaks or umiaq (women's boats) were unknown, and fishing and hunting of land mammals were the primary sources of living. About the same time, the low and subarctic areas in Greenland were inhabited by the Saqqaq culture (about 2500 to 800 B.C.) who used boats made from hides and settled on both the west and east coasts of Greenland. After an apparent 500-year absence of habitation, a new wave of immigration brought the Independence II culture (800 to 400 B.C.) to the high arctic north Greenland, but after this culture succumbed, the area appeared to be uninhabited for 1,500 years (Grønnow 2000). In the milder low and subarctic Greenland, the Dorset I culture (about 500 B.C. to 200 A.D.) followed after the Saqqaq culture on the east and west coasts, using different hunting and fishing methods. After this time, Greenland appeared to be uninhabited for 600 years until immigration by the Dorset II culture (about 800 to 1300 A.D.) took place from Canada around 800 A.D. and settled in Northern Greenland. This culture used iron from meteorites and traded copper with groups in Canada (Grønnow 2000).

The last major wave of immigration by the Thule Culture took place from Canada around 1200 A.D. (Gulløv 2000). This is the origin of the current Inuit population and was based on hunting and fishing. During the summer, people used tents and followed the seasonal migrations of animals to ensure adequate supplies for the long winters in more permanent settlements. Hunting tools became highly developed during this period, and larger boats, kayaks, and dogsleds provided this culture with higher mobility (Gulløv 2000). Most of the prehistoric remains seen in Greenland today originate from the Thule Culture.

About 985 A.D., an immigration of Norse farmers from Iceland took place led by Eric the Red. The Norse immigrants settled in the fjords of Southern Greenland near Nuuk and lived from farming, hunting, and fishing (Arneborg 2000). Leif den Lykkelige (Leif the Happy) introduced Christianity in Greenland, and several churches were constructed—today, the remains are among the tourist attractions. The 1,000-year celebration of Leif den Lykkelige's discovery of America and of the introduction of Christianity in Greenland was celebrated in 2000 and integrated as part of tourism activities. Sometime after 1408, however, the Norse settlers disappeared, possibly also due to climatic changes. The Thule Culture expanded south along the west coast and inhabited the deserted Norse settlements, while the Dorset II culture moved south along the east coast but vanished around 1400 A.D. (Gulløv 2000). In 1721, the Norwegian Priest Hans Egede arrived in Greenland in search of the Norse settlers, but then started to missionary among the Inuit and to establish trade posts. This initiated a process of colonization, which lasted until 1953 when Greenland finally became an equal member of the Danish Kingdom with two representatives in the Danish Parliament. In 1979, the Greenlandic Home Rule Government was established and continues its representation in the Danish Parliament.

Many of the cultural remains from the various prehistoric and historic periods in Greenland, as well as present-day culture, are part of the tourist attractions in Greenland.

Natural Resources and Nature Protection in Greenland

Nature in Greenland consists of a number of habitats, which are closely adapted to the high, low, and subarctic conditions, and are generally more sensitive than habitats in temperate areas. Although Greenland has a low population density, the use of natural resources is a key factor in Greenlandic society and increasingly affects the sensitive nature areas (Due and Ingerslev 2000).

The North East Greenland National Park established in 1974 is the world's largest National Park. In addition, there are five smaller protected areas (table 1). In

Table 1—Protected areas in Greenland subdivided into ice-free land, sea, and ice areas (source: Due and Ingerslev 2000).

Protected areas	Total area	Ice-free land	Sea area	Ice area
	----- <i>km²</i> -----			
National Park	956,700.0	176,076.0	110,600.0	670,024.0
Melville bugt	7,957.0	703.0	5,193.0	2,061.0
L yngmarken	2.0	2.0	.0	.0
Paradis dalen	90.0	90.0	.0	.0
Qinnguadalen	45.0	45.0	.0	.0
Akilia	1.4	1.4	.0	.0
Total protected area	964,795.4	176,917.4	115,793.0	672,085.0

total, Greenland has 964,795.4 km² of protected land of which 176,917.4 km² (18 percent) is ice-free land, 115,793 km² (12 percent) is sea, and 672,085 km² (70 percent) is ice. In addition, Greenland has appointed 11 Ramsar areas with a total area of 15,457.5 km², and hereby recognizes an international responsibility for protection of wetlands and bird habitats. However, no legislation has been established to protect these areas, and hunting, fishing and access is regulated through the same rules as outside the Ramsar areas (Due and Ingerslev 2000).

Nature protection in Greenland is based on legislation from 1980 (Landstingslov nr. 11 af 12. November 1980 om Naturbeskyttelse i Grønland), but is currently under revision. Assessment and gap analyses of the current nature protection in Greenland (Due and Ingerslev 2000) conclude that problems are related to protection against overhunting of species, destruction of sensitive habitats, and lack of compliance with international objectives of protecting a representative selection of Greenlandic nature.

The high, low, and subarctic zones are not represented equally in the protected areas, as 71 percent of the marine and 44 percent of the terrestrial high arctic is protected compared to less than 3 percent of the low and subarctic. Secondly, most of the current and future changes and impacts from hunting, fishing, agriculture, mineral extraction, recreation, and tourism take place in the low and subarctic zones with the least protected area. It is recommended to expand nature protection in these zones, to include more sensitive habitat types in protected areas, to establish general nationwide protection measures for some types of sensitive habitats, and to continue assessment and mapping (GIS based) of natural resources in Greenland to facilitate nature protection and management (Due and Ingerslev 2000).

Tourists primarily visit the coastal areas of Western, Southern, and Eastern Greenland, while the remote North East Greenland National Park can only be visited with special permission and receives approximately 150 annual visitors. The impacts from tourists on nature and culture in Greenland remain largely unexplored. However, an ongoing inter-Nordic project involving Greenland, Iceland, and Svalbard aims at mapping the environmental impacts of the Arctic tourism industry and, thereafter, to suggest means of implementing more sustainable forms of tourism. In Greenland, the project involves two destinations: Ilulissat and Ammassalik. Initial results indicate that impacts on nature originate as much from local residents as from tourists, and that visual pollution greatly influences tourist perceptions and the quality of the experience. Consequently, the project has initiated the removal of some of the worst eyesores in Ilulissat (Nordic Council of Ministers, cited in Hendriksen 2002, ongoing project).

The transition of Inuit culture appears to also influence the use and perceptions of nature resources in Greenland. While traditional Inuit culture has a deep respect of nature and uses only the resources needed for sustainable living, Hansen (2001) suggests that this has severely changed and massive overhunting and wasteful use of natural resources are taking place that may deplete the Greenlandic fauna in a few decades. The meat extracted through hunting by far exceeds 100 percent of the needs in Greenlandic society, but massive waste causes 76 percent of meat and meat products to be imported to Greenland. Hunters, fishermen, and most politicians appear to deny the problems, which are linked to a policy of subsidies (Hansen 2001). In addition to this threat from overexploitation in Greenland, a new status

report on biodiversity of Arctic flora and fauna by Conservation of Arctic Flora and Fauna (CAFF) also takes a pessimistic view on the future of Arctic ecosystems. It points to threats from global warming, introduction and invasion of nonendemic species, and pollution from industry and cars that accumulates in the arctic ecosystems (Toft 2001).

The transition from a traditional hunting and fishing community to a service and information society is also changing the recreational patterns among residents in Greenland. The trend is to spend free time in nature outside inhabited areas, and the number of leisure boats and huts are increasing (Due and Ingerslev 2000).

Existing Research on Tourism and Nature

Both research on tourism and nature is undertaken in Greenland, but mostly as independent disciplines. Greenland has a long tradition of natural sciences research related to geology, glaciology, biology, and so forth, since the Commission for Management of Geological and Geographical Investigations in Greenland was established in 1878 and later became The Commission for Scientific Research in Greenland (KVUG 1998). In 1999, the organization was restructured to strengthen arctic research, and in the National Strategy for Polar Research 1998 to 2002, tourism is mentioned. It states that it is important to investigate the social and cultural basis for sustainable development of the various industries including tourism. Secondly, that it will be of high importance to analyze the economic, social, and cultural effects of new industry projects at the local, regional, and national levels, and to conduct comparative studies with other arctic regions (KVUG 1998).

In general, research in Greenland appears to be dominated by research in natural sciences with little connections to studies of human activities including tourism. In 1995, only 17 percent of the total funding for research in Greenland was allocated to social sciences, statistics, humanistic sciences, and health sciences combined, while at least 67 percent was allocated for natural science research and the remaining for institutions and programs with a strong focus on natural sciences. A total of 139.5 million Dkr were allocated by both the Greenland Home Rule Government and by the Danish Government (Statistics Greenland 1997). The limited attention to research on sociocultural aspects in Greenland is also mentioned by KVUG (1998) and by Dahl and Sejersen (2000), who attribute this to isolation, closed research environments, and lack of funding. A new cultural historical research program on cultural encounters in southern Greenland has just started but none of the five subprojects have relations to present day culture or tourism. Tourism research in Greenland has also been quite limited but is emerging as a prioritized topic (KVUG 1998). In addition, the statistical data collection by Statistics Greenland has been significantly upgraded since 1998.

In table 2, the identified research and background projects related to tourism in Greenland are listed and grouped by overall topic. Many of the identified tourism projects focus on development projects and strategies. Among the more academic studies are a high number of student projects, which tends to be printed in small numbers. Many of the tourism studies involve quite local case studies, but some are characterized as pilot studies and may possibly later be broadened to other regions. Many of the studies are ongoing, and results have not yet become available. However, tourism research seems to be increasing.

Some initiatives have recently been taken to establish more sustainable types of tourism, and Greenland participates in work on developing a Nordic strategy for sustainable tourism (Nordic Council of Ministers 2001). So, interest in finding new ways for a balance between nature, culture, and tourism seems high. Linking this to sound research initiatives and lessons learned in other circumpolar regions appear to be highly relevant.

Future Trends in Tourism in Greenland

The national strategy to increase tourism to 35,000 by 2005 is strongly focused on quantitative growth of numbers and expenditure of tourists. But recently, the strategies for future tourism development in Greenland have shifted toward stabilization and more qualitative aspects, and sustainable tourism is now part of

Table 2—Identified research and background projects related to tourism in Greenland categorized by topics.

Topic	Identified projects related to tourism in Greenland
Nature/environment	Project on development of Nordic Strategy for Sustainable Tourism (Nordic Council of Ministers 2001) Ecotourism in Greenland (Mordhorst 1998) Tourism and environment in the Arctic (Hendriksen, ongoing) Tourism in Polar environments—Greenland and Antarctica (Christensen 1990) ^a
Culture and history	Concepts for monitoring natural and cultural heritage in the Arctic (Nordic Council of Ministers Arctic Programme, ongoing)
Local communities	Strategic plan for local involvement in tourism (TUC, unpublished internal report) Analysis of public and private interest groups' involvement in Greenland tourism strategic planning (Amondson 1998) ^a Coping strategies and regional policies—cases from Uummannaq, Greenland (Bærenholdt 2001, ongoing)
Tourists	Statistics Greenland conducts surveys of tourist activities, expenditure, and profile (upgraded since 1998)
Tourist industry	Image analyses of Greenland tourism (TUC, unpublished internal report) Investor analysis of opportunities and barriers for tour operators in Greenland (TUC, unpublished internal report) Education/competence development in tourism (TUC, unpublished internal report) Analysis of the role of outfitters in Greenland (Rasmussen 1998) ^a A study of tourism planning and evaluation of two tourism projects in Greenland (Guldbrandsen 1995) ^a Project about development of hunting tourism in Greenland (Bertelsen and others 1991) ^a Project on opportunities for wilderness tourism in Greenland (Guldbrandsen 1991) ^a Applied tourism development projects (such as, reconstruction of Erik the Red's settlement near Qaqortoq in Greenland) (North Atlantic Co-operation (NORA) Background studies of tourism in Norway, Northwest Territories, and Island (Erhvervsdirektoratet Grønlands Hjemmestyre 1991) Background studies of tourism activities in North-Western America as inspiration for tourism in Greenland (Nyegaard and Mordhorst 1994) ^a Study of tourism in southern Greenland (Egede 1992) ^a A study of opportunities for sustainable tourism development in South Greenland (Skourup 1996) ^a

^aStudent projects.

the national strategy. Within the past 2 years, focus has shifted to development based on regional strengths and three primary themes: (1) strengthening local and regional cooperation and involvement, (2) organization of tourism institutions, and (3) development of competencies and documentation of tourist data (Olsen 2001).

Local initiatives to establish sustainable tourism are emerging in Greenland. One example is in Rode Bay north of Ilulissat where tourism is being established as a strategy to support the declining traditional fishing and hunting community threatened by depopulation and closure of industries. The sustainability approach includes close cooperation with villagers in establishing new jobs by taking tourists sailing and dog sledding, by supplying local products to the hostel, and from a newly established restaurant in a restored old warehouse. Residents also rent out rooms, produce handicrafts, and arrange “kaffemik” (social gathering with coffee); and information to tourists on village life and culture is also emphasized (Philbert 1999).

As such, the trends in tourism in Greenland are shifting toward quality and sustainability as well as added value by income generation from tourism. Greenland Tourism is currently establishing strategies for 2003 to 2005 based on these criteria and with a focus on advice, marketing, information, documentation, and education (Greenland Tourism 2001b).

Future Research Needs

The summary of the existing knowledge and research findings of the tourism-nature relations in Greenland indicates a number of problems exist in the structure, focus, and content of research programs.

Currently, there is a very high focus on natural science research in Greenland, but few resources are allocated to social research or to tourism research. Given the rapid transitions of Greenlandic society and the growth in tourism, it appears timely to give higher priority to research of sociocultural and tourism issues. As in many other countries, much research appears to be carried out within single disciplines and rarely considers tourism issues. Given the complexity of tourism and its economic, environmental, and social implications on Greenlandic society, a more cross-disciplinary approach seems relevant.

Actual tourism research in Greenland is emerging, but is suffering from the traditional high focus on economic and management issues with little consideration of the cultural or natural context. It is included in the last phase of the national 1998 to 2005 Tourism Plan to conduct social and environmental impact analyses (Lyck 1998). The environmental issues related to the industry are emerging in some newer projects, and sustainability is mentioned conceptually, but still lacks the data and research on nature and culture.

Most of the tourism research is very local, and results cannot be generalized to other parts of Greenland. However, several projects are pilot projects, and more full-scale investigations may be carried out later if the case study results and funding allow. General baseline studies and more structure in the existing knowledge base on tourism would greatly improve the basis for tourism studies in Greenland. The increased data collection on tourists by Statistics Greenland represents great improvements in this direction.

Some established international cooperation is found in the areas of natural science research and also in tourism in a Nordic context such as the Nordic Strategy for Development of Sustainable Tourism. Greenland also participates in networks on tourism in the West Atlantic region. Tourism studies could greatly benefit from utilizing and expanding some of these networks.

Many of the tourism studies appear to have a development and management focus, but more academic projects providing deeper insights may be needed, although it is understandable that applied studies are given high priority at this stage.

Suggestions

In short, it is suggested that research programs in Greenland consider changes toward giving higher priority to research on sociocultural and tourism issues when compared to natural sciences research. Secondly, that within tourism research the focus is broadened and more attention is given to interrelations between tourism and environmental and social issues. Thirdly, that the focus on development and management projects in tourism is counterbalanced with more "academic research" but still with opportunities to be applied to actual places and problems. Fourthly, increased cross-disciplinary and international circumpolar research may also strengthen tourism research as many of the same type of problems, ideas, methods, and results may be compared across the polar region and inspire Greenland to avoid some of the problems found in relation to tourism development elsewhere.

Some of the topics for cross-disciplinary research on tourism and nature in Greenland could possibly include:

- The differences in the perceptions and cultural meanings of nature/wilderness/environment among locals and tourists and to assess if these differences are points of conflict in tourism in Greenland and elsewhere in the Circumpolar Region.
- Assessments of community impacts and resident preferences in relation to tourism development.
- Local involvement in tourism development and integration of indigenous knowledge and values into tourism.
- Criteria and indicators for sustainable tourism development in Greenland. Economic, social, and environmental indicators should be included.

Many additional research topics may emerge as being highly relevant to tourism in Greenland. Given the sociocultural transitions of Greenlandic society, the decline of traditional industries, and changing relations with the natural environment as well as the increasing role of tourism, it appears timely to increase research on how tourism interrelates with and affects local communities and nature in Greenland.

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Iceland's Central Highlands: Nature Conservation, Ecotourism, and Energy Resource Utilization

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Abstract—Iceland's natural resources include an abundance of geothermal energy and hydropower, of which only 10 to 15 percent is currently being utilized. These are clean, renewable sources of energy. The cost to convert these resources to electricity is relatively low, making them attractive and highly marketable for industrial development, particularly for heavy industry. About 100 proposed power projects are in the process of being evaluated under the Master Plan for Hydro and Geothermal Energy Resources.

Expanding the use of renewable energy resources to build up heavy industry is seen by many in the current Icelandic government as the best way to develop and diversify the country's future economy. This would provide a much needed economic boost, and considerably more employment opportunities to rural communities, including the Eastern Fjords. However, there is growing public concern about the government's heavy industry policy and its possible detriment to Iceland's unspoiled wilderness and the fast-growing ecotourism industry.

Introduction

Most of Iceland's high temperature geothermal areas and some of its most powerful river systems are located in a vast, uninhabited, and unspoiled area known as the Central Highlands. This area has a high conservation value and is becoming increasingly popular with tourists, in part because of its barren landscape, unique volcanic formations, and spectacular glaciers. The tourism industry (13 percent) has now bypassed industrial production (11 percent) to become the nation's second most valuable source of currency income—the fish industry still being the most valuable at about 50 percent (OECD 2001). The Icelandic government is also interested in further promoting the development of ecotourism.

Iceland's economy depends heavily on a rich endowment in natural resources. The fishing industry depends on Iceland's marine resources, energy-intensive industries on abundant hydropower, and the tourism industry on nature and natural beauty. Both successful fish exports and ecotourism depend on the reputation of a pristine environment and a positive, "green" international image. The Icelandic government is currently facing a major decision. Should the government's efforts now be focused on developing the abundant power resources for electricity-intensive, heavy industry such as aluminum smelters in hopes of a large economic return, or should the government protect the unique volcanic landscape and sensitive ecosystems of the Central Highlands and concentrate instead on ways to expand ecotourism? The two policy directions, by their nature, may not be compatible, although the current administration is currently working to meet both energy development and nature conservation objectives.

This paper presents a brief overview of the geologic and geographic reasons for Iceland's abundant renewable energy resources, volcanic wilderness, glaciers, and fragile ecosystems. This is followed by a summary of environmental legislative activity through the 1990s. Two large government-run projects, the Regional Plan for the Central Highlands and the Master Plan for Hydro and Geothermal Energy Resources, will be discussed. Following this will be a discussion on current energy use in Iceland and a major study done in 2000 on ecotourism in Iceland. This paper will conclude with a discussion of the importance of an Earth systems science approach to the collection and analysis of scientific data to help governments make well-informed policy decisions.

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Volcanic Activity and Geothermal Power

Iceland is a young volcanic island, 103,000 km² (39,768 miles²) in size, that just touches the Arctic Circle to the north. It is located on the Mid-Atlantic Ridge, a divergent plate boundary between the North American and Eurasian plates, which are spreading apart at a rate of 2 cm per year (0.8 inch) (fig. 1). The spreading has been discontinuous along the rift zone, with perhaps no activity for 100 years, and then a 2-m (6.6-ft) spread over the span of only a few years, with subsequent volcanic and seismic activity. Iceland is also a surface manifestation of a large mantle plume or hot spot. The center of this hot spot, an area where heat flow and lava production is much higher compared to surrounding areas, is now located beneath the Vatnajökull Glacier in Southeastern Iceland (the largest glacier in Europe), part of the Central Highlands (fig. 2).

Figure 1—Location of volcanic systems in Iceland that have been active in post-glacial time (last 10,000 years) (figure redrawn from Einarsson 1994).

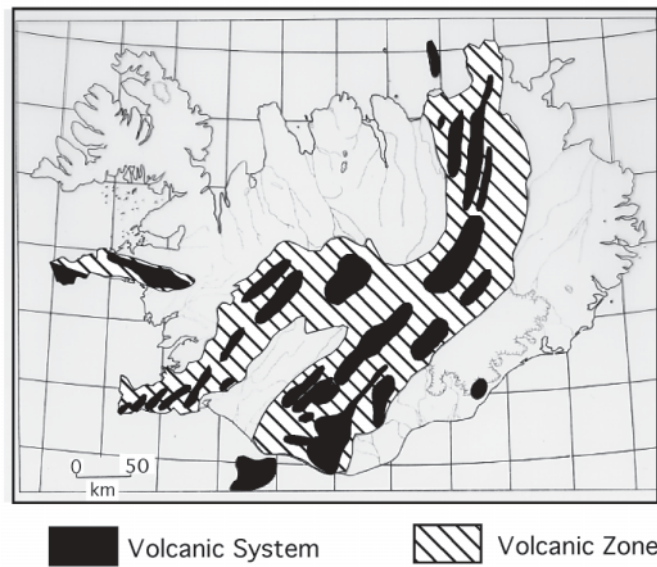


Figure 2—Map showing the main glaciers of Iceland and the defined boundary of the Central Highlands (modified from the Regional Plan for the Central Highlands 1999).



About 400 km (249 miles) of the otherwise submerged Mid-Atlantic Ridge is exposed above sea level in Iceland. The plate boundary through Iceland manifests itself with a central rift zone running in a northeast/southwest direction across the middle of the island. This zone includes, from the southern part to the northern part of the island, a total of 30 large active volcanic systems, each composed of a central volcanic complex and accompanying fissure swarm. Each swarm is usually 40 to 100 km (25 to 62 miles) long and 10 to 30 km (6 to 19 miles) wide. There is more variety of volcanoes and diverse volcanic activity here than in any other part of the world.

On average, there is a volcanic eruption in Iceland every 4 to 5 years, and this frequency has been increasing over the last 20 to 30 years. The unique location of Iceland on a plate boundary, with all of its varied volcanic and ground-rifting features, geothermal activity, and glaciers, makes Iceland an important study area for the Earth sciences. In Iceland, both the internal and external forces that create and erode the land are easily observed.

The abundance of volcanic activity is the reason for Iceland's abundant geothermal power. There are numerous geothermal systems, ranging from fresh water to saline and from warm to super-critical temperatures. The low temperature geothermal fields, registering 20 to 100 °C (68 to 212 °F), are primarily utilized for house heating and are mostly found outside the active rift zone. The high temperature fields, with water steam up to 350 °C (662 °F), are found inside the rift on the plate boundary where volcanism is most active (fig. 3).

Meteoric water percolating down through the porous lava fields is heated by the shallow magma lying beneath the island, circulates, and is brought back to the surface in the form of hot springs, geysers, and boiling clay pits. High temperature fields are harnessed primarily for electricity generation, but only a small fraction of this resource has yet been tapped. One reason is that most of the high-temperature geothermal fields are located in a remote part of the island—the Central Highlands.

Glaciers, Glacial Rivers, and Hydropower

Glaciers, large and small, cover about 11 percent of Iceland. The largest is the Vatnajökull Glacier, about 8,130 km² (3,139 miles²), with a large number of outlet or valley glaciers flowing down to the surrounding lowlands. Vatnajökull, together with Langjökull and Hofsjökull to the west, are the three crown jewels of the Highlands. All glaciers in Iceland are temperate glaciers and very sensitive to climatic changes resulting from global warming. Glacial meltwater accumulates to form forceful glacial rivers that flow rapidly over steeply mountainous terrain, forming deep canyons and abundant waterfalls as the water moves to the coast, supplying the island with an abundant but largely untapped source of hydropower.

The areas of greatest future hydropower potential are north of the Vatnajökull Glacier and in south-central Iceland, west of the Vatnajökull Glacier (fig. 4). Both

Figure 3—Geothermal power potential in Iceland. Location of low and high temperature geothermal fields in Iceland (figure courtesy of the National Energy Authority, Iceland).

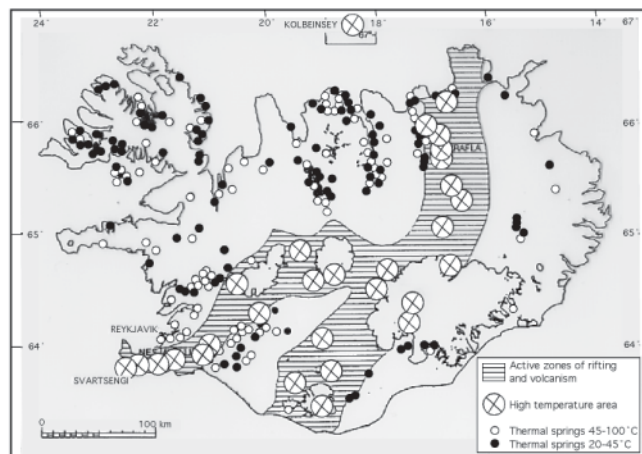
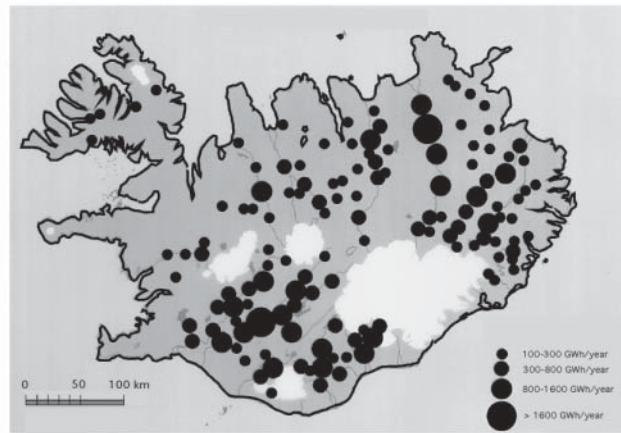


Figure 4—Hydropower potential in Iceland. Calculated direct runoff energy in each 20 km step along rivers (figure courtesy of the National Energy Authority, Iceland).



areas are known for their varied volcanic landforms and high ecological sensitivity. In south-central Iceland, there currently exists several hydropower plants, but the area could be further utilized. The area north of Vatnajökull is still untapped, although a recent proposal by the National Power Company to build a 750 megawatt hydropower plant is being considered.

Wilderness of the Central Highlands

Iceland is sparsely vegetated. Only about 30 percent of the country has good (more than 75 percent) or fairly good (50 to 75 percent) vegetation cover (OECD 2001). Fifty percent of the island is completely devoid of any vegetation, if the extent of glaciers and lakes are included, and the remainder is very sparsely vegetated. The vegetation is comprised of grassland and cultivated land, as well as moss heath, heath, and wetlands. Woodlands (mainly birch) are less than 1 percent of the country. Wetlands, on the lowlands close to the coast, used to be prominent, but most have been drained for agriculture. Iceland has 485 vascular plant species (including 100 introduced species), 560 species of bryophytes, and 510 species of lichens. There are only four species of terrestrial mammals (arctic fox, mink, reindeer, and mice), the arctic fox being the only indigenous one. Bird life is a bit more diverse with 75 nesting species, although 32 species are rare. About 1,250 insect species have been identified (OECD 2001).

The Central Highlands are about 40 percent of the total land area in Iceland (an area the size of Switzerland). The highland plateau is uninhabited open volcanic wilderness with wide vistas, where visual signs of human activities are only limited to road tracks and scattered mountain huts. Most of the area is covered by lava fields, volcanic sand, and gravel. The most active and largest volcanic centers are in the Central Highlands.

The porous volcanic soil in Iceland is fertile, but lacks cohesiveness because of high volcanic ash but relatively low clay content. This makes the soil prone to erosion by wind and water. Subsequently, Iceland experiences rather severe soil erosion due to winds and harsh weather. The areas experiencing the most severe erosion are the areas that also lack vegetation cover, as is the case in the volcanic wilderness of the Central Highlands where the vegetation cover is at best sporadic to none, with only occasional "oases" of continuous vegetation in low-lying areas where there is a high ground water table. Low precipitation in parts of the Highlands is also a factor. The area north of Vatnajökull is in a rain shadow, with precipitation less than 400 mm (1.3 ft) per year, adding to the soil erosion and difficulty for vegetation to take hold. South of the Vatnajökull Glacier, precipitation is measured at more than 4,000 mm (13 ft) per year.

Decades of overgrazing in the lowlands and up into the Central Highlands, primarily by sheep, is also a contributing factor to soil erosion, although steps have now been taken to reduce the number of sheep stocks. There is strong evidence to indicate that at the time of the Norse Vikings' settlement of Iceland in the 9th century A.D.,

there was extensive birch forest cover and a climate that supported the harvesting of grain crops, with only 20 percent of the island barren.

Tourists come here to observe the unusual, "unearthly" beauty of the volcanic landscape. These moonscapelike features made the Central Highlands an ideal training ground for the Apollo 11 astronauts before the first lunar mission in 1969. This landscape is very sensitive to manmade structures such as power plants, dams, paved roads, high masts, and high-tension power transmission lines. Herein lies the conflict. Preserve the unique and untouched beauty of the Central Highlands for a profitable and expanding tourism industry, or utilize the tremendous hydro and geothermal power potential to give rural communities along the coast a much-needed economic boost.

Iceland's Regional Development Policy

The population in Iceland at the end of the year 2000 was just about 283,000 or 2.7 people per km². The majority of the population, approximately 175,000 people, live in the capital Reykjavik and surrounding area. One of the main concerns of the Icelandic government is the movement of people from the rural towns and villages into the capital for greater employment opportunities. Opportunities for employment are dwindling in the rural areas. During the 1989 to 1999 period, only two regions apart from the Capital area had modest population growth. In the rest of the country, population is declining (OECD 2001). The main objectives of the government's regional development policy are to strengthen urban settlement and encourage population growth in those communities that can promote diverse and prosperous economies by providing key services and by utilization of natural resources, both on land and on sea. There is a focus to reduce the movement of population to the Capital region in order to ensure optimal use of the nation's installations. Heavy industry is to be established outside the Capital area. Building an aluminum smelter in Eastern Iceland, where the population fell 20 percent during the 1989 to 1999 period, will have economic benefits, social benefits, and environmental consequences. High-tension power transmission lines carried on large masts will transport electricity from a hydroelectric power plant in the Central Highlands into the small, rural towns in the Eastern Fjords, and would then allow for the construction and operation of heavy industries such as aluminum smelters. This idea has attracted foreign investors and may revitalize rural communities and slow the movement of people into Reykjavik. Tourism in these rural communities is seasonal and, therefore, does not support continuous employment.

Land Use Planning and Wilderness Protection in the Central Highlands

Environmental Awareness of the 1990s

Increased environmental awareness in the 1990s led to an era of much dispute about the future of the Central Highlands and its possible development for renewable energy. During that decade, important milestones in Iceland's environmental legislation were enacted into law. In fact, environmental legislation was almost completely revised in the 1990s to take into account domestic objectives and international commitments. The decade began with the establishment of the Ministry of the Environment in 1990, responsible for nature conservation, physical planning and construction, public health, and pollution control. When Iceland became a signatory on the 1992 Port Agreement creating the European Economic Area (EEA), the country had to adopt most of the European Union (EU) environmental directives relating to air, water, waste, chemicals, foodstuffs, and environmental impact assessments (EIA). The remainder of the decade showed the enactment of a number of environmental legislations, including the Environmental Impact Assessment Act of 1993, with a revised EIA Act approved by the Icelandic Parliament in the year 2000, meeting the requirements of the 1997 EU directive (OECD 2001).

Regional Plan for the Central Highlands

In 1994, the Ministry of the Environment, and the Planning Agency established the Regional Plan for the Central Highlands in Iceland (1999). The main goal of the Regional Plan, which was approved in 1999 and runs to 2015, is to coordinate natural resources and land use in the Highlands in a sustainable way. Overseeing this Regional Plan is the Planning Committee with representatives from the associations of municipalities surrounding the Highlands. The Regional Plan was prepared in close collaboration with a large group of scientists, institutions, and individuals.

As a basis for this plan, an extensive biological and physical inventory was compiled, and analyses were conducted, based mainly on existing knowledge and data. The land in the Central Highlands was broken up into 55 land units, outlined on a series of maps (fig. 5). Each land unit was then analyzed and assigned value under several different categories. This type of analysis allowed for a visual overlay of landscape units, so each unit's value within each particular category could be compared. The main categories for evaluation and comparison included: (1) vegetation cover, biological diversity, and the extent of soil erosion; (2) areas of high protection value due to unusual geological formations and landscapes; (3) other areas of natural beauty and significance, as well as historical sites; (4) traditional utilization such as grazing, fishing, and hunting; (5) hydrological characteristics, including hydro and geothermal power potential; (6) tourism and recreation potential; (7) transportation and development of roads; and (8) sanitary issues in the Highlands.

The Regional Plan limits buildings and other structures to certain zones and leaves for conservation as much untouched nature as possible. Roads across the Highlands are to be kept to a minimum, sufficient for summertime traffic only. Offroad driving was banned throughout Iceland in 1999. Service centers for tourists are to be located primarily at the periphery of the Highlands to serve as a base for day tours within the Highlands, although there will also be smaller service centers within the Highlands. The Regional Plan does allow hydroelectric plants in the Highlands, but no geothermal power plants, at least for the time being. The results were definitive that there are large areas (comprised of several landscape units), both to the north and southwest of Vatnajökull Glacier, that have high values in many categories, including both high protective value and high power potential. Furthermore, the Regional Plan's objective to limit buildings and other infrastructure in the Central Highlands led to the enactment of the 1997 Planning and Building Act, stating that all Iceland, not just inhabited areas, is subject to physical planning and licensing.



Figure 5—Fifty-five landscape units used in the Regional Plan for the Central Highlands (1999).

Master Plan for Hydro and Geothermal Energy Resources

In 1999, the same year the Regional Plan was completed by the Ministry of the Environment, the Ministry of Industry and Commerce in cooperation with the Ministry of the Environment began work on the Master Plan for Hydro and Geothermal Energy Resources in Iceland (see also Thórhallsdóttir, this proceedings). The Master Plan was executed under the slogan "Man-Utilization-Nature" and in response to lively debate and public concerns regarding the future of the Central Highlands. A Steering Committee made up of 16 members, supported by about 50 experts working in four different Working Groups, was assigned the task to evaluate about 100 proposed power projects. The Steering Committee expects to finalize the evaluation of the first 25 project proposals by the end of 2002.

Land Rights and Land Ownership

The problems in choosing between various land use options relating to nature conservation and tourism, grazing or other traditional uses (fishing and hunting), and energy use are compounded by the fact that property rights in the Central Highlands are largely undefined. The Highlands, until recently had not been divided into municipalities, as no need for the land was perceived. Even today, few property rights are defined. Increasingly, however, the Highlands are seen in terms of their potential for energy production and ecotourism. A total of 34 surrounding municipalities now have interests in the Central Highlands and claim traditional user rights.

Government objectives for sustainable development in the Central Highlands depend greatly on resolving these land ownership issues. Two important laws were therefore adopted in 1998 to address this issue. First was the Municipalities Act, which subdivided the whole country into municipalities, including the Highlands, thereby extending subdivisions previously focused mainly on coastal areas. Each municipality has until 2007 to draw up a land use plan for its area, approved by the Ministry of the Environment. The second law, the Public Lands Act, sets out ways to delineate private land, public land, and upland range. Land, where no ownership can be proven by 2007, would be state owned. The designation of land as public land, however, will not cancel traditional user rights, and all decisions on land use will have to be subject to consultations with appropriate parties, and overseen by a special committee.

Similarly, according to the 1998 Act on Research and Use of Underground Resources, all extraction of ground water, minerals, gravel, and geothermal heat now requires a license by the Ministry of Industry and Commerce. Land owners, on private lands, are compensated through individual agreements or property size assessments. This Act does not cover the use of hydropower or geothermal steam for electricity production.

Establishment of the Nature Conservation Agency

Nature conservation also received a new legal and institutional base in the 1990s with the establishment of the Nature Conservation Agency. This agency, which is under the authority of the Ministry of the Environment, supervises the management of all protected areas in Iceland and is responsible for general nature protection, including monitoring the effects of human activities on the natural environment. The 1999 Nature Conservation Act defined the categories of areas subject to specific protection, such as areas of special biological value, areas with special or endangered species, key habitats, and ecosystems, and areas for recreational uses. This new Act takes into account many of the provisions of the European Union's 1992 habitat directive, but also covers landscapes. Types of landscapes that benefit from general protection under the Act include wetlands, lava fields and volcanic formations, lakes, and hot springs. The Act also allows national parks to be established on privately owned land. The Ministry for the Environment is to prepare Nature Conservation Plans every 5 years, with the first due by 2002. The Institute of Natural History, under the Ministry of the Environment, published in June of 2000 a detailed survey to assess the protective value of various habitat types in the

Central Highlands (Einarsson and others 2000). A national strategy for the conservation of biological diversity is also under preparation.

About 10 percent of Iceland's land area is currently protected. Ten new protected areas were established in the 1990s, representing 54,100 ha (133,684 acres), including a new wetland Ramsar site in 1996 in Grunnaþfjörður (OECD 2001). Most of the 83 protected areas are small, but this trend has also changed with the 1999 Nature Conservation Act. In the year 2000, 10,000 ha (24,710.5 acres) of Iceland's second biggest bay, Breidafjörður, with its many islands, was declared a protected area. In July of 2001, 91,500 ha (226,101 acres) on the tip of the Snæfellsnes Peninsula, including the Snæfellsnesjökull Glacier, an active strato-volcano and surrounding lava fields with unusual geological formations became the fourth national park in Iceland. By the end of 2002, territories under protection in Iceland may have doubled to 20 percent, with the proposed plans to expand the Skaftafell National Park (south of Vatnajökull) to include the entire Vatnajökull Glacier and some adjacent areas as one big national park. The Vatnajökull National Park would reportedly be Europe's largest national park. However, the park would not extend north or west of Vatnajökull Glacier, leaving open the possibility to harness the large glacial rivers that flow north from the big glacier for hydropower development.

Another proposed plan being discussed by environmental NGOs is to grant park protection to much larger expanses of the Central Highlands, including the area north of Vatnajökull Glacier.

Power Utilization and Ecotourism in the Central Highlands

Iceland's Power Potential

Iceland's electrical power potential, from combined hydro and geothermal sources, is estimated to be 50 terawatt hours (TWh) per year, taking economic and some environmental factors into consideration (National Power Company 1995). One TWh is equivalent to 1,000 Gigawatt hours. Electricity from hydropower is estimated to be 30 TWh per year, and from geothermal power 20 TWh per year. In 1995, only 4.8 TWh per year of this overall electrical power potential, or about 10 percent, was being utilized.

In the year 2000, of the total energy used in Iceland, 50 percent came from geothermal power, 32 percent from fossil fuels, and 18 percent from hydropower. That is a total of 68 percent of energy from renewable resources. The use of fossil fuels, in Iceland is almost exclusively for running automobiles and the shipping fleet, with only 0.1 percent used for electricity generation in the year 2000. Over 64 percent of the harnessed geothermal power is used directly for house heating. Other uses are electricity generation (16.9 percent), industry (6.6 percent), swimming pools (4.5 percent), greenhouses (3.3 percent), aquaculture (2.7 percent), and snowmelting (1.7 percent). On the other hand, hydropower provides 83 percent of electricity generation (National Energy Authority 2000).

General utilities consumed only 36.6 percent of the total electricity generated in Iceland in the year 2000. The remaining 63.4 percent was used by energy-intensive heavy industry such as two aluminum smelters and an iron-silica smelter (National Energy Authority 2000). The most rapid yearly growth in consumption of electricity has also been in the heavy industry sector (Iceland Statistics 2000).

Growth in Tourism

The total number of tourists visiting Iceland in the year 2000 was about 303,000 (Icelandic Travel Industry Association 2001), exceeding the total population of Iceland for the first time. Tourism statistics show that the number of foreign visitors has increased rapidly over the last few years. Annual foreign tourist arrivals nearly doubled from 1990 to 1999, from 142,000 to 263,000. Using this rapid rate of increase, it is now estimated that it will only take 10 to 15 years for the total number of foreign tourists to reach one million.

Recently, two surveys were conducted to better assess the impact of suggested hydropower plants in the Central Highlands on ecotourism. The first study (Sæthórsdóttir 1998) was done on behalf of the Ministry of Industry and Commerce

and the National Power Company, and the second study (Gudmundsson 2001) by the Icelandic Travel Industry Association (called for by the Master Plan for Hydro and Geothermal Energy Resources).

Based on Gudmundsson (2001), it was estimated that the total number of tourists visiting the Central Highlands in the summer of 2000 was as high as 115,000—the Central Highlands being one of the key attractions in Iceland. About 90 percent of foreign tourists and 86 percent of Icelanders cite enjoyment of nature as being the most important reason they come to the Central Highlands. Enjoyment of the view, simply being outdoors, and to experience peace and quiet complete the top four reasons visitors come to the Highlands. While there, planned leisure activities include photography, bathing in hot springs, short and long hikes or walks, bird watching, observing subarctic ecosystems and geological formations, and glacier exploration.

An overwhelming majority of visitors to the Highlands were against structures such as hydropower or geothermal plants in the same areas they were visiting. As high as 94 percent of foreign visitors and 91 percent of Icelanders regarded hydropower structures such as dams, manmade reservoirs and diversion channels, power lines, and masts undesirable in the landscape. More than 71 percent of tourists (foreign and Icelanders) said they would visit these areas less often if power plant structures were present. The majority of visitors said they would like to see no new structures in the Highlands, keeping the landscape as unspoiled as it is today.

The only structures considered desirable by tourists in the Highlands were mountain huts and rescue huts, marked walking and hiking routes, information signs, and campsites. The survey found that tourists favored improvement of the roads, but that the roads should continue to be gravel roads only suitable for summertime travel. Many visitors agreed that more toilets are needed in the Highlands, as well as improved accommodation options in selected locations. Additionally, over 90 percent of all foreign tourists surveyed favor the establishment of a national park in the Central Highlands.

If one million tourists visiting Iceland in the coming years are an accurate projection, protecting the Highlands from tourist traffic also becomes a major consideration. Increased road traffic, lodging, waste disposal, and protection of the fragile vegetation become critical issues in preserving the unspoiled beauty of the Central Highlands.

Earth Systems Science Approach to Wilderness Protection

The decisions now facing the Icelandic government are complex and will have consequences reaching far into the future. It is perhaps unreasonable to expect that no power plants will be built in the Central Highlands in the near future. The matter then becomes how best to proceed to protect and preserve as much wilderness as feasible, particularly those areas with the highest ecological, biological, and geological protective values. On the other hand, there is a carrying capacity of the land that has to be established and not exceeded, regardless of the number of tourists who want to visit the Central Highlands. Environmental impacts from perhaps hundreds of thousands of tourists, concentrated both seasonally and geographically, will be severe if not properly mitigated. Currently, infrastructure is not in place to receive the projected numbers of tourists in the years to come.

So, how should we proceed? For the proper perspective, we need to more fully understand the sensitive subarctic environment of the Central Highlands. We need to understand how the various natural processes and anthropogenic effects taking place in the Central Highlands, on Iceland's lowlands, and in coastal zones are interrelated. The Earth's systems—the geosphere, hydrosphere, biosphere, and atmosphere—are all interrelated, with continual exchange between systems and subsystems. Changes in one system can have unexpected and sometimes detrimental effects in other systems. Detailed and systematic analyses in the fields of biology and ecology, geology and geophysics, geography, hydrology, meteorology, and climatology have to be carried out, then interrelated to develop a clear picture of the long-term impacts to the entire system that would be affected by both large-scale energy resource utilization and ecotourism.

Significant contributions to this end were made with the Regional Plan for the Central Highlands (1999), the Master Plan for Hydro and Geothermal Energy

Resources, and the study done by the Institute of Natural History on the protective value of various habitat types in the Central Highlands (Einarsson and others 2000).

It is vital to understand what it is we are actually protecting, assigning protective values in much the same way we assign monetary values. Knowing what we know now about what can happen when entire systems are not fully understood, it is unadvisable to make decisions about developing Iceland's power potential without all the facts in place, paying the environmental consequences 20 years from now. Time must be given to the scientists to evaluate the issues using an Earth systems science approach.

The Environmental Research Institute at the University of Iceland in Reykjavik is currently working on ways to bring scientists of all disciplines from all over the world together, with the formation of an International Center for the Environment (ICE), to jointly analyze critical environmental issues such as what Iceland is now facing in the Central Highlands. Iceland's struggle with preservation of wilderness versus energy utilization is not unique. It is vital to open up a consistent forum for the exchange of ideas and research results. The ICE would make it much easier to develop opportunities for international research cooperation on interdisciplinary environmental projects. Scientific results produced in this way will give members of governments the most complete and reliable scientific information necessary to formulate policies and minimize detrimental effects to the environment.

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Can Traditional Ecological Knowledge and Wilderness Benefit One Another?

Henry P. Huntington

Abstract—Traditional ecological knowledge is the system of experiential knowledge gained by continual observation and transmitted among members of a community. It includes spiritual aspects of the proper relationship between humans and their environment. In this context, the Arctic is considered to be “peopled land.” More recent uses of the term “wilderness” recognize the presence of certain types of human activity, among them traditional hunting, fishing, and gathering. Protecting these activities often requires protection of basic ecological processes, and thus is compatible with the overall goals of many protected areas in the Arctic. Indeed, protecting areas can help protect traditional activities, which are the basis for accumulating, perpetuating, and transmitting traditional knowledge within a community. Traditional knowledge, for its part, can contribute not only to our common ecological understanding of a region, but also to an understanding of the various perspectives from which an area and its uses are viewed. Such insight can help in the designation and management of wilderness areas by identifying areas of convergent interest to support the core values of both traditional systems and the concept of wilderness.

Introduction

Traditional ecological knowledge (TEK) can be defined as “the system of experiential knowledge gained by continual observation and transmitted among members of a community” (Huntington 1998). As a system of knowledge, TEK is more than an accumulation of facts and conjecture. It is a way of organizing one’s understanding of the natural world, and as such it includes spiritual aspects of the proper relationship between humans and their environment. The concept of “wilderness,” by contrast, tends to emphasize the absence of humans, or at least the absence of signs of human presence (Klein, this proceedings; Nash 1982). The perception of the Arctic as a vast wilderness is at odds with the views of the region’s indigenous peoples, for whom the Arctic is “peopled land.”

In considering the role and management of wilderness areas in the Arctic, can the perspectives of TEK and those of “wilderness” find common ground? If so, can each perspective offer useful insights and benefits to the other? In this paper, I argue that TEK can benefit to the extent that wilderness contributes to protecting the way of life upon which it is based, and that wilderness designation and management can benefit from a closer understanding, not only of the ecological aspects of TEK, but also its insights into the relationship of people with the natural world. These benefits are not romantic notions, but practical suggestions drawing on experiences elsewhere.

Traditional Ecological Knowledge

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The term “traditional ecological knowledge” often conflates several forms of knowledge and several dimensions of understanding (Agrawal 1995). In a broad sense, it refers to knowledge gained by persons with a long history of living or working in a given area. This knowledge is not static, but reflects changes in resource use patterns and other aspects of the relationship between people and their surroundings, including the influence of scientific and other forms of knowledge. “Local knowledge” is related, but may not have the time depth implied by the word “traditional,” which indicates continuity over generations rather than only the life of an individual.

“Indigenous knowledge” is also used, with the specific reference to certain people as holders of that knowledge.

These and related terms are often used to indicate a contrast with “scientific knowledge,” which itself often conflates knowledge gained through the scientific method with a more general sense of knowledge generated through Western traditions of inquiry and teaching. Thus, TEK and related terms sometimes imply not only the holders of such knowledge but also the means of its acquisition. For the purposes of this paper, however, TEK refers to the knowledge that is held by members of a community and that reflects their understanding of their surroundings, regardless of the sources of that knowledge. I also recognize the spiritual dimension of TEK that is often overlooked in the emphasis placed on its ecological aspects.

Within hunter-gatherer societies, TEK was the basis for actions concerned with survival—procuring food and shelter, traveling safely in an often-dangerous landscape, and negotiating the cycles and changes within one’s environment. In the modern era, TEK has at times been used, or at least recognized, as the basis for or a supplement to ecological research, or as a contribution to resource management (Berkes 1998; Huntington 2000; Johannes 1993). At the same time, there have been some efforts to document TEK in the Arctic, in part to make it accessible to a broader audience, or to apply it to specific management purposes (Ferguson and Messier 1997; Huntington and others 1999; Johnson 1992; McDonald and others 1997; Mymrin and others 1999; Nakashima 1990). Primarily, such work in the Arctic has focused on species or on regions, and occasionally on environmental impacts (Huntington and Fernandez-Gimenez 1999). Little has been done to examine the relationship of TEK with specific land-management practices, traditional or otherwise.

The use of comanagement approaches to resource and land management is a form of implicit use of TEK. The explicit goals of comanagement typically involve resource users and local residents to improve management practices. Although this approach is sometimes criticized as a form of co-optation (Nadasdy 1999), there are many examples of its success in promoting more effective management (Huntington 1992a; Pinkerton 1989). In Alaska and Canada, there have been attempts to take a limited comanagement approach to certain aspects of resource management in National Parks (Caulfield 1988; Sneed 1997). The success of these efforts is mixed (Huntington 1992b). The groups convened for this purpose have typically functioned more as advisory committees, although more recent structures in Canada have given more weight and scope to the comanagement approach (Huntington 1992a; Sneed 1997).

Elsewhere in the world, research has examined the importance of sacred sites and other forms of local land-use governance (Gadgil and others 1998; Stevens 1997). Sacred groves and sacred sites can function as refugia within intensively used areas such as northeastern India (Gadgil and others 1998). By prohibiting human use of certain areas, harvested species are protected from extirpation. In the subarctic, Berkes (1998) found that Cree hunters rotate harvest areas based on careful observation of local beaver (*Castor canadensis*) population trends and habitat condition. Harvests are adjusted accordingly, based on a detailed understanding of the dynamics of trapping, overpopulation, and recolonization. Although such practices do not include a concept of wilderness, they indicate the relationship of certain traditional land-management practices to ecological outcomes.

How, then, can TEK contribute to wilderness in the Arctic, where there is little traditional basis for such land-use designations? Two aspects of Arctic wilderness can potentially benefit from understanding TEK and its perspectives. First, there are few truly uninhabited regions in the Arctic. People have long used the areas that are now designated as wilderness. As discussed in the next section, those uses are recognized to an extent in North America. But the nature of human involvement with the natural world is not static, and TEK offers a way of understanding how that relationship is shaped in the eyes of Arctic residents—what is important to them and why. Such an understanding may help identify and resolve potential conflicts in wilderness designation and management.

Second, TEK offers ecological insight, which can help in the management of natural resources in wildernesses just as in other areas. Understanding how an ecosystem functions is an essential part of providing effective conservation. Few wilderness

areas are not subject to threats from outside their borders, such as climate change, pollution, and impacts to migratory species. An understanding of how the areas are susceptible and what can be done about it is necessary to address those threats. Traditional ecological knowledge cannot solve every conservation problem, but it offers insights unavailable from other sources, and thus deserves attention. In addition, the inclusion of the knowledge of Arctic residents often opens the door for greater inclusion of their ideas and, ultimately, support for the conservation measures that are developed (Stadel and others, this proceedings). Done properly, this is not a process of co-optation, but a form of negotiation involving compromises and, ideally, leading to mutual benefit.

Wilderness

The concept of “wilderness” has been explored by others in this volume, particularly Klein (this proceedings). Nash (1982) describes the evolution of the concept in the United States and its extension to Alaska through the Alaska National Interest Lands Conservation Act of 1980. In particular, the application of the term “wilderness” in Alaska has accommodated some human activities, particularly subsistence hunting, fishing, and trapping. There has been conflict over interpreting these provisions (Allen, this proceedings). The development of new technologies, such as all-terrain vehicles and their use by residents of Anaktuvuk Pass in Gates of the Arctic National Park, sparked a long battle about the definition of “traditional.” Furthermore, there remain divergent views on what “wilderness” is. But the attempt to accommodate humans within the concept of wilderness is, in the United States, a significant step in recognizing the nature of “peopled land” in the Arctic.

How does wilderness designation and management, as practiced in Alaska today, contribute to TEK? The development, use, and perpetuation of traditional practices, including the system of TEK, require access to the land, the waters, and their resources, including some degree of control over the way the resources are used. In other words, the future of TEK depends on the ability of its holders to continue the traditional practices upon which TEK is based, and to provide opportunities for younger generations to learn these practices and to accumulate the knowledge that allows one to conduct them efficiently and safely. Wilderness, in its legal definition, may not be necessary to achieve this goal, but the ecology of the Arctic requires large areas of undisturbed habitat for the sparse and wide-ranging species that support human communities. To the extent that wilderness helps protect the land, and to the extent that traditional activities are accommodated in wilderness management, wilderness areas can help protect the ways people use them, and the relationships that Arctic peoples have developed with their surroundings.

This is perhaps a romantic vision for the relationship between wilderness and TEK. Many forces in today’s world affect the ways that Arctic people relate to their surroundings. Wilderness is likely to play only a minor role. Nonetheless, this role can be vital by providing a degree of stability for ecosystems at the scale of landscapes. A stable landscape and “stable” land management, however, are not necessarily the same thing. The latter can easily come to be seen as restrictive, especially as traditional practices and knowledge evolve, but this danger only reinforces the need for active involvement of local people in wilderness designation and management.

Discussion

One way to understand wilderness is as an opportunity for people to see and understand the natural world in a visceral way, through stepping into large landscapes that show no obvious signs of humans, where there is no intermediary between the individual and nature. Such an experience can be fragile—the knowledge that others have come before or the contrails of a jet far overhead can disturb the sense that one is alone and the first to see a place. Yet the expectation of such an experience is itself a human construction, one that shapes the way the landscape is seen and understood. And it is a vision perhaps unfair to those who happen to live in undisturbed regions, as is the case in much of the Arctic. To declare the land as beyond human

touch is to expropriate territories that have been inhabited and used for millennia, and to deny the meanings and purposes local cultures have attached to places.

But, if we understand wilderness to reflect and stimulate an original and deep connection between people and their surroundings, then local cultures may find a place in wilderness, and perhaps “wilderness” may find a place in local cultures (Stadel and others, this proceedings). Such a hope is admittedly idealistic, and putting it into practice is fraught with difficulties. Local cultures adapt and evolve, adopting new technology and practices. Such changes are often at odds with romantic perceptions that indigenous cultures are timeless and immutable, that they are somehow diminished by adopting modern tools and ideas. Modern goods and gear help make the presence of Arctic communities more visible, often, as through litter and vehicle tracks, in ways that offend “wilderness” sensibilities. Yet the relationship and understanding that Arctic peoples have for their surroundings goes beyond the idea of “untracked wilderness,” the merits of which lie in aesthetics rather than ecology.

Traditional knowledge offers a way of exploring differences in perception and looking for underlying similarities and compatibilities. There will remain real differences in perception, in philosophy, and in goals between wilderness advocates and local residents. Nonetheless, there should be ample common ground on which to build a sense of shared purpose and outlook. Exploring the relationship between TEK and wilderness is a means by which individuals and organizations can better understand one another. Such an effort is not a naïve hope of finding unity where it may not exist, but a practical approach and one that takes considerable time and effort. The success of some of the groups created to co-manage species shows that TEK and western science can be used together with mutual benefit if there is a commitment to do so. In wilderness, such a goal is worth striving for.

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Increasing Value of Wilderness: Protecting Cultural Heritage

Herbert O. Anungazuk

Abstract—The land and the sea have been direct links to survival to a hardy group of people in the northern extremes of the Earth. Each group is separate to its own domain, and their land and sea differ even if the distance between them is not great. The rules of the land and the sea are unwritten, and they have been presented to the new generations by Elders through the stories of the land and the sea since dawn immemorial. Cultural heritage is a virtue in itself; it is a value so profound that it continues to be imbedded deeply in the hearts, minds, and souls of the people who have weathered change despite overwhelming odds.

Wilderness Is Land

Wilderness is land; land is **nuna**. Our definition of land is identical to how land is defined by others, but in our way, we are people of the land, people of specific places. Some of us are coastal people, some of us are mountain people, others are river people. Some are islanders. My people are the **Kingikmiut**. We are people of **Kingigan**, whom outsiders today know as Wales, Alaska. **Kingigan** has supported vast numbers of people with its renewable and very natural resources since dawn immemorial. A large portion of our territory is the sea, and the sea is the reason **Kingigan** is situated where it is. The Bering Strait is the gateway for all species of marine mammals, birds, and fish, and their return is eagerly anticipated each spring when the northward migration begins. Weather, although it is still susceptible to sudden change, is at its most tranquil stage during this period, and the hunter takes full advantage of these favorable conditions. Sleep is forgotten, but even a hunter needs rest. You sleep on the move or atop ice floes and let the cold wake you. This is the time of the hunter, and these are the most memorable moments in his life as a provider for his family and community. He is following in the footsteps of his ancestors.

Behind us is the wilderness of tundra consisting of a small mountain chain, a lagoon, ponds, and streams that empty into the Bering Strait, and from this point, the land swoops into other nations, environments, and other seas far from our own. We are Earth people with very strong ties to the sea. We can be identified as ice people because we follow or head into the ice in pursuit of the animals of the sea that we harvest to sustain ourselves. The land and the sea are our substance. When we are asked where we are going, we say to others we are going “into the land” or “into the ice or sea.” In the ways of our prey, the ice and the sea are beyond our natural limits, yet we have learned to hear the land and the sea beckon to us.

The call of the wilderness is strong, and it is this call that has been heard by the people of the region since the first dawn. It is a very strong call that man and woman, young and old, respond to in very earnest expectation, especially at certain times of the year. The call is infectious. This is a time when people as a nation heal from the wounds of want after a winter of using up food stores gathered at the last season. As a nation of people, they must heal into togetherness because the animals they rely on for their sustenance are far larger than they are, and require the effort of a unified boat crew and also the complete community. And it is a time of learning for everyone.

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Cultural Heritage Is Vital

Whenever a discussion of our infinite ways surfaces through the teachings and testimonies of the Elder, awestruck ears listen. There is a profound beauty in cultural heritage, and to want to know more and learn about your culture and heritage is overwhelming. Many times what others hear is unexpected, and to have heard what was not expected is stunning even to those who have matured under the guiding hands of the Elders. It is an extremely important experience to hear the Elder relate the ways of the people to you. It is reality of the highest caliber, and it has kept and continues to keep the flame of survival alive. Culture and heritage are the fabric of the people.

Morals, values, or virtue—they are all unique elements of any society. They are vital components of every group of people on earth, and they are very much a part of indigenous man. They are much a part of our ethics, but so much has gotten in their way. Formerly, a Council of Elders paved the path to solidarity. This system formed a solid unit, and it became the way of the people. Several Native corporations, formed with the passage of the Alaska Native Claims Settlement Act (ANCSA) in 1971, have unique reminders to their members that they are a part of a society that has few equals in the western world. **Inupiat Ilitqusiatic** is the guideline followed by the Northwest Arctic Native Association based in Kotzebue. **Inupiat Ilitqusiatic** is the spiritual trail of our ancestors, as it portrays a lasting image of the wisdom of the Inupiat of the Kotzebue region and the rest of the indigenous world, and it is a baseline that is observed and followed by every indigenous group represented in North and South America. The reindeer people and sea mammal hunters of the Russian Far East are a part of this unique group.

Inupiat Ilitqusiatic: Every Inupiaq is responsible to all other Inupiat for the survival of our cultural spirit, and the values and traditions through which it survives. Through our extended family, we retain, teach, and live our Inupiaq way. With guidance and support from Elders, we must teach our children Inupiaq values; knowledge of language; sharing; respect for others; cooperation; respect for Elders; love for children; hard work; knowledge of family tree; avoidance of conflict; respect for nature; spirituality; humor; family roles; hunter success; domestic skills; humility; and responsibility to tribe. Our understanding of our universe and our place in it is a belief in God and a respect for all his creations.

In brief, every group has a set standard so that everyone can pursue life as a whole person and as a part of a whole community. The Council of Elders decided everything, and this system has seen some grave reviews from present day authority in communities that continue to follow the ancient ways of their ancestors.

Our Culture Has Been Threatened

We are a generous culture, and generosity is one of the special traits of our people. The message of survival provided by the ancient hunter survives to this day, but the culture has been impacted by so many barriers that it is remarkable that the culture and its identities have survived at all. Our learning becomes a connection with our inner self. Only recently our Elders sat freely with our children without so much as a thought that something may be amiss, and taught the children what they have learned since they too were children. In only less than a century, many children who were born to us were taken away and ravaged of their ancestral ways by authority and raised in the ways of another world that is not ours. The way of teaching was an ancient proven way, but in a short period it was driven away by the dominance of western education. The rituals and the ceremonies disappeared, but fortunately they were only driven underground, as they are coming back among some people.

Mass death to unknown diseases, social ills, and imbalances, and breakdown of the family unit are encounters that have brought unbearable pain to all groups of indigenous people. We have been susceptible for only a brief period, yet we have lost so many. The Elder is a firm part of the profoundness of indigenous culture, and there is intense pain when the Elder passes into the sunset through death. The Elder is the person who is in possession of our cultural heritage, and more than a life is gone if they have not been given the opportunity to share their knowledge that

has been given them of our culture. Since dawn immemorial, we as descendants of the ancient hunter have learned and caused others to learn about our rich cultural heritage without so much as a thought of compensation, because to ask for something in return is not our way. Northern culture is boundless. The culture remains boundless even with unlimited barriers that it has faced in such a short period. You name it, we have faced it. Religion, education, even our intellectuals have been derided and called illiterate, not realizing that the newcomer himself is illiterate in our ways.

The trail of life for the descendant of the ancient hunter has been extraordinary where despite innumerable barriers the new generations have fared very well. We look at wilderness with respect, as the wilderness has been there since the dawn of time. The wilderness is the home of many animals that we prey upon. Ice, snow, winter, and summer are a part of this wilderness. We are taught to always be prepared. We are all hunters. The best. How many are the millenniums that the Kingikmiut have been on their land? We are told that the people departed our land at one point in time, but we returned when the new world we went to did not have the abundance of sea mammal oils that is seemingly always available in Kingigan. Our story does not say if we had to take the land away from another people, but I assume that we had to because you do not wantonly leave a place and expect someone to not be there. Why we left is no longer known. Could it be the constant winds of the Bering Strait? That is hardly likely, because even the most inert or sluggish individual can withstand the discomforts of storms and icy cold once he realizes that the land will provide for his sustenance.

The period of immeasurable losses for many, many groups of people began with the arrival of scores of outsiders in the last decade of the 19th century. With this intrusion began loss of language, culture, and heritage. Many groups are no longer with us because they have fallen to disease, needless bloodshed, or outright oppression. Our story tells us that man and animal lived together in our land without want of food or need of shelter. Forests abounded in our land until the land burned and took them away. Today, you will find trees that have been petrified over the countless eons, attesting that our lands were once woodlands and not the tundra you are familiar with today. Surely, the land was an Eden then, and remains in many, many ways an Eden today.

My father's generation is a generation of orphans. Their mothers and their fathers fell suddenly to an unknown disease in one painful, sudden period. How terrible it must have been, because they tell us so little of what they went through, except only during brief, painful moments. Many of us do not ask them how that time of loss was for them because to relive those painful moments would be too much for them to bear. We would like to hear more, but it is not for us to ask, and now many of those who could have told the story are gone. For each and every generation since that period, there have been painful moments that have tested the will of the people, but we have persevered, and since the first cries of grief began, every generation has cried deep, dry, silent tears because they have lost someone very dear to them. Many from my generation do not know the commanding presence of a grandfather or a grandmother.

Not all of our history is sad and forlorn. We have family that despite sadness, loss, and addiction remain intact. Each group of people, each family unit is different. We have many incarcerated in prisons. Many, many hunters. Many of them are in for the barest of crimes, and very few are beyond help. The life history of our people, of special individuals and events, is being revealed slowly. In part, a lot of our story has yet to be discovered even by our own people, myself included. It is not because of ignorance that someone may believe some of us know so little of ourselves.

If you enter my country over land you will find that my land is guarded by the remains of my ancestors. The aboveground burials on the mountainside are old. They are ancient. So many of them have been absorbed into the earth, but as a child, I remember many we passed by as we went onto the mountain to gather green leaves with Momma. I was afraid of them because of my absence of understanding reality. Just in the last century our beliefs of including the implements of survival that were traditionally placed in the graves of the deceased was no longer observed because the insistent missionary declared that the dead did not need the material wealth that they had on Earth with them on their final journey. The mountainside surrounding Wales is our burial ground. Omiaks, kayaks, weapons, and stone lamps

are visible, as are driftwood and whalebone that will be used to construct new homes in the land beyond. Kingigan has not followed the ways of a traditional burial in over six decades.

My friend, and the friend of many, the late Bill Tall Bull of Montana, related a story to several of us toward the last years of his life in Oregon. He stated that prior to the passage of the Native American Graves Protection and Repatriation Act (NAGPRA), he and members of his people, the Northern Cheyenne, journeyed to the Smithsonian Institution to prepare for the return of their ancestors' remains, which had been removed from their places of rest and brought to a distant place far from their land. The men began their day with a blessing ceremony at sunrise, and ended with another ceremony at the end of the day. As the men came nearer to their country they began to hear laughter and happiness coming from the boxes in the van; the ancestors, in their spirit, knew they were going home. The journey took several days, and on arrival every home was visited by the ancestors who returned in clothing no longer used by the people, and speaking an old dialect because theirs had changed with the times. Hearing their voices was a step back into time, but the new generations who received them could understand them as they said, "Look! They still sound like us." "They still look like us." Chilling? Perhaps, but not to indigenous people. I am sure that several others who have heard this story related by Mr. Tall Bull have told this story to others because stories like these are a distinct part of our unique ways and our observances with reality.

The NAGPRA is an important tool to all Native Americans, and this Act has assisted them in the return of their ancestors' remains to their places of origin from where they were wantonly removed. Both sides need to be very careful when they commemorate themselves to the explicit words of NAGPRA. In the Inupiaq universe you will find identical place names a great distance apart. A mistake occurred with ancestral remains being prepared for return to their places of origin that my community had taken responsibility for, and the Smithsonian Institution had prepared them for their return to the community of Wainwright in the arctic slope instead of Wales. On a site visit to Wales in 1996, the person responsible for human remains for the Alaska region at the Smithsonian was informed by me of the possibilities of identical Inupiaq place names occurring in the Inupiaq world hundreds of miles apart. Fortunately, an embarrassment was averted to the Smithsonian when it was found that the coordinates did not match the site of removal to the point of return of the human remains taken from Mithlitaqvig.

Today, you will find photographs of our ancient dead in publications that were most possibly acquired without the permission of entities who handle affairs for the communities around the State. Many communities have rules posted that you cannot wander in tribal lands without a guide, but it is difficult to enforce the rule because of the lack of funding to support enforcement. Mithlitaqvig, mentioned above, is an ancient village situated 30 miles from Wales that was wiped out as a community during the 1918 influenza pandemic. From this site were removed 75 human remains. The traditional council of Wales, as a surviving community, declared responsibility for the repatriation of the remains from Mithlitaqvig. Some villages became extinct as communities, and of those who survived, mostly orphans, Wales vested responsibility and did not place the children in orphanages as authorities declared. My father's generation was raised by the grandfathers and grandmothers of that period, and my father's generation did very well to continue the traditions of our ancestors, the same traditions that many of us share with continuing descendants today. Recently the National Park Service did very well in honoring the ancestors of my people with a video titled "**Siulipta Paitaat, Our Ancestor's Heritage.**" The title means "a gift that is given to you," in this case, a gift from the ancestors. "Siulipta" is a very unique word, as it defines our ancestors as "the first," or very simply, "the first people."

Someone who does not know us will say we have names for everything. We do. Names of places are very important to indigenous people. We are Earth people, and as everything is associated with the Earth, everything has names. Place names identify us to our former nomadic culture, as we were indeed nomads until time in the form of rules and regulations, foreign laws, schools, and churches caught up with us and seemingly locked us away into villages, towns, and cities, but our lifestyles

continue to draw us away to gather the seal, the caribou, leaves, and berries at certain times of the year.

All animals have names. The whale and walrus have been honored with several names because they have played an important role in our survival since dawn immemorial. The oogrük pup gains another name after his brother or sister is born in the spring. Plants, insects, and the four directions have names. It is said that snow has multiple names, and it does, but some of the names have "sunk," as some Elders would describe loss. Most indigenous groups have not subjected themselves to naming landforms after individuals purely because the people are known as being from a specific place, and land has always been associated with certain groups of people. We identify ourselves to a certain place and over the ages being of a certain place, and belonging to a certain group has become very, very important. Some of us have names identical to names of specific places, but the honor of being named after place rests on your parents, as usually they honor you by naming you after the place of your birth. Namesakes who identify, in jest, with ownership of lands that bear their name are looked at with quiet mirth.

So much of our land has changed in one short period. Although the influx of Christianity, western education, and rules and regulations span only a century in many parts of the north, their influences are seen daily in all parts of the land, and felt by all walks of life. One of our distinguished Elders related, "I wonder what 'they' took from our land," when the subject of the return of group-specific items from a museum was mentioned. Concerning this subject, it was learned that the **inugaguthlungit**, or what has been referred to as the "little people," were seen again when spirit masks of Yupig origin were returned briefly to the **Nanukauyarmiut** or people of Toksook Bay in Southwest Alaska.

Our gravesites, many as old as time itself, have been pilfered since others began going into our lands unannounced. Gone from their final resting places are vast numbers of human remains and cultural items. The possibilities are extremely high that legions of former servicemen of the Cold War era are responsible for the removal of human remains and burial items from many gravesites throughout this great land. It must be revealed to them that their wanton acts may be responsible for needless suffering, family strife, and even death among their families. Removing human remains and grave offerings was very possibly an innocent act to them. The placement of burial items on gravesites is not done wantonly and without reason among many people in the indigenous world. They are placed during the final burial ceremony so that the grave offerings will accompany the departed into the land beyond.

Wilderness as Rival and Ally

Rivals and allies can be perfectly paired if intertwined within the natural realm of the northern world and perfect adversaries when natural forces show their awesome power to those who must live in the environment along with the animals that support them. Ice, wind, and fog are natural elements of the Bering Strait, and each one of them can be deadly if the hunter is not properly prepared to meet them on even terms. The forming of clouds on both sides of the Bering Strait is an indicator that you must head for home, posthaste. You will still get caught by the wind, but it will not be nearly as bad as leaving a half hour later. You want to cross the gauntlet of ocean currents only once because you feel that you have used up all your chances once you have reached the safety of the shore. One can never forget the experience of wind-driven 9-foot seas once you have reached safety. The waters of the Bering Strait can be tranquil one moment, then the waters will gnash with the winds the next. Change is that fast in the Bering Strait, yet in this day and age, rivals and allies have added new forms never expected by our ancestors.

Time flies fast in this day and age. Tonight you will see the Big Dipper fill with the tranquil lights of the Aurora Borealis, and tomorrow you will see the dipper empty into the dark, starlit skies of the Tohono O'odham Nation of Arizona. Our Elders tell of becoming a hunter when only the winds and the paddles of men moved the boats across the sea, and that was only yesterday. The young hunters then, now

old and gone, told of using the bolas and failing miserably in their efforts to learn the ways of providing for a family. The nuwithkiq (sandpiper) or the opilitungiq (red phalarope) are usually the first harvest of young boys, and the small birds are eagerly sought by them to show future hunting prowess. With the seal, they are graduating into the first stages of manhood, yet the first sea mammal harvest he takes home does not belong to him and his family, and only after he has taken an oogruk (bearded seal) can he marry. In the mind of the hunter, the oogruk is a powerful being, and the hunter knows to be careful with him.

“Wilderness” can be a difficult word to attempt to explain because there is no term to actually define it. At the beginning of this paper, it was stated that wilderness is land, and in every reality it is. An attempt to place an identity to the term by our western counterparts usually leaves an empty void if some effort is done to understand wilderness. In all cases, wilderness will simply always remain land.

Let me end by telling a very short story on an observance placed into print by a man who taught for many years in the community of Ambler, Alaska, on the Kobuk River. Nick Jans has written three very inspiring books on his association with the people of Ambler, the Kobuk River, and survival in the northland. In his second book, Mr. Jans related a very special observance in our relationship with the land. In this case, he tells of thanks being expressed continually by one of the Elders he had an opportunity to work with on the Kobuk harvesting fish. In the book, one of the women is expressing thanks, and Mr. Jans thought that the thanks were being expressed to him. The lady was saying, “taiku” (thank you), and just before Mr. Jans answered, she added again, “One more time we come here—taiku.” (Adapted from “Black River Autumn” in: *The Last Light Breaking, Living Among Alaska's Inupait Eskimos*, by Nick Jans, Alaska Northwest Books. 1993.) If that does not make you cry or whimper, I don't know what will. That is our sincere relationship with our land.

Quyana.

Biodiversity in Finnish Wilderness Areas: Historical and Cultural Constraints to Preserve Species and Habitats

Anna-Liisa Sippola

Abstract—The present status of species and habitats in Finnish wilderness areas is largely a consequence of past administrative, use, and management traditions in northern Finland. The existing wilderness legislation sets a framework for management, but historical uses and administrative decisions have influenced many prevailing practices. In addition, management of many uses is complicated by overarching legislation. The present wilderness legislation is a tradeoff between conservation aspects and both traditional and modern use forms, including reindeer herding, hunting, fishing, berry picking, forestry, mineral prospecting, and tourism. Many of these use forms have negative impacts on biodiversity. Forestry, which is allowed in restricted parts of wilderness areas, fragments areas and destroys habitats of old-growth forest species. Large reindeer populations have caused overgrazing in many areas. Heavy hunting pressure has caused the decline of capercaillie and black grouse populations, and increased tourism causes disturbance of animals and terrain. The constraints to preserve species and habitats are often related to the contradictory goals of different laws or complicated administrative structures. Hunting is an example of a use form where different organizations are responsible for monitoring of game populations, making recommendations for prey numbers, selling of licences, and law enforcement. Different values and attitudes also complicate conservation efforts. Conservation of large predators, for example, conflicts with the interests of reindeer herders, often leading to poaching. This paper examines both historical and cultural factors that affect the status of biodiversity in Finnish wilderness areas, and discusses possibilities to achieve commonly accepted goals and practices in biodiversity conservation.

Introduction

The natural, as well as the cultural, environment has its own history. In a geological time scale, forces such as climatic warmings and coolings, ice ages, continental drifts, and other large-scale events have affected landscapes and species. For the past thousands of years, the history of the natural environment has been closely connected with the history of human beings almost everywhere on the Earth, and it is not always easy to detect whether the present state of nature is a result of purely natural processes, or if it has been influenced by human activities. For example, the present structure of many old-growth boreal forests of Finland, which in their natural state are modified only by storms, forest fires, and small-scale gap dynamics, may in fact be modified by slash and burning cultivation, man-induced forest fires, and cattle grazing over hundreds of years (Heikinheimo 1915).

The ecological history—also known as historical ecology—of an area considers the relationships between man and nature over the course of time. The focus of ecological history can be purely on the state of nature in different times, but it can also be directed to the relationships between ecology and economy, to the attitudes and awareness of a society toward environmental aspects, or to the regulation of the resource use and environmental policy of societies (Massa 1991). In these aspects, ecological history is closely related to environmental economy, environmental policy, and sociology (Massa 1994).

Wilderness areas, according to most definitions, have been considered as uninhabited, remote, and free of human influence (IUCN 1998; Martin 1993). However, except for the most remote polar areas, practically all regions that we now consider as wilderness areas have been inhabited or utilized by native people for thousands,

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or even tens of thousands, of years (Hestmark 1993; Magga 1993; Miller 1993). In later times, many of the areas were also used by settlers from other regions. In Fennoscandia, the history of human presence starts soon after the last Ice Age about 10,000 years ago, when the first hunters and fishermen followed retreating ice toward the North (Lehtola 1997). In Finnish Lapland, the oldest traces of inhabitants, which most probably were ancestors of the present Sámi people, date back to 7000 B.C. (Huurre 1983; Julku 1985). In the Middle Ages, Finnish peasants used to make long fishing and hunting trips to the backcountry areas, which, in the course of time, were divided between villages and families (Luukko 1954). The Finnish word for wilderness, “erämaa,” comes from that time. It refers to a hunting area divided by hunters, or to the game divided by hunters. It also came to mean areas that were separated from cultivated areas (Hallikainen 1998). Thus, there is a long history of human use of the wilderness areas in Finland, and even the word for wilderness in Finnish has a strong use aspect. This aspect has also influenced current legislation concerning the wilderness.

The first use of the wilderness in Lapland was for hunting and fishing. Starting in the 16th century, the Sámi residents adopted large-scale reindeer herding from Swedish Lapland (Lehtola 1996), and in the 17th century, the Finnish settlers introduced agriculture to the area (Luukko 1954). The peasants collected hay for cattle from natural meadows, many of which were located far away from villages, around lakes, or on the riverbanks. Later, these meadows were attached to farms as separate private allotments. The use of these meadows ceased in the 1950s and 1960s, but these allotments can still be found even in remote wilderness and nature conservation areas.

Modern times have brought new forms of use such as forestry, tourism, and recreation to Lapland. Partly as a response to these pressures, mainly those of forestry, 12 wilderness areas were established in Finnish Lapland in 1991 (Erämaakomitean mietintö 1988; Erämaalaki 1991). Their total area is approximately 1.5 million ha (3.7 million acres). Many of the traditional, as well as some of the modern, forms of use are allowed in the wilderness. These include hunting, fishing, gathering natural foods, reindeer herding, mineral prospecting, and restricted tourism and forestry. In this article, I consider more closely three of these forms of use—hunting, reindeer herding, and forestry—with the aim of giving an overview of their historical and cultural background and the constraints that these backgrounds set for species conservation today.

Biogeographically, the Finnish wilderness areas represent three different biomes: northern boreal forests, characterized by Scots pine (*Pinus sylvestris*) and Norway spruce (*Picea abies*), the ecotone of treeline area with mountain birch (*Betula pubescens* ssp. *czerepanovii*) as a timberline species, and the subarctic tundra zone with barren mountains (Erämaakomitean mietintö 1988). Because of their northern location, the designated wilderness areas can protect only a small portion of the total fauna and flora of the country. However, wilderness areas are important for the protection of species that have a typically northern distribution, many of which are not found in the more southern latitudes. These include arctic and subarctic animals such as the arctic fox, gyrfalcon, and bar-tailed godwit, and many arctic plant species (such as *Diapensia lapponica* and *Ranunculus glacialis*). Besides the arctic species, wilderness areas are important for the species that need large territories such as the wolverine and golden eagle, and for species that are confined to old-growth taiga forests, such as the capercaillie, Siberian jay, and Siberian tit, and a large number of lower plants and animals that are specialized in old-growth forests.

In the larger context, Finnish wilderness and protected areas serve as a corridor between the continuous taiga forests of northwestern Russia and the mountains of northern Norway and Sweden, where these countries have their largest conservation areas. For instance, the wolf population of northern Finland and Scandinavia is much dependent on the population source on the Russian side of the border. Less movable species, such as invertebrates and plants, also exchange genes over large areas. This often happens slowly through neighboring populations, and therefore requires large continuous habitats with long temporal continuity.

Species Preservation and the Use of Wilderness: An Overview of Three Forms of Use Within Their Historical Context

Hunting

Hunting, fishing, and gathering natural foods are the oldest forms of using wilderness areas. Old Sámi culture in the forested area of Lapland was mainly based on these livelihoods. The most important game animal was wild reindeer, which was hunted using pitfalls. Beaver, fox, and ermine furs were important for trade and the payment of taxes (Luukko 1954). Both of the most important game animals, wild reindeer and beaver, were hunted to extinction in the 19th century. These extinctions were related to the expansion of Finnish settlers to Lapland and the introduction of firearms. Large flocks of wild reindeer were killed by hunting and by destroying their rangeland with fire, which was used by peasants in slash and burn cultivation. Finnish peasants also used forest fires to drive away the Sámi, whose reindeer destroyed the settlers' hay storages (Fellman 1906; Tegengren 1952). The right to hunt beaver, which was originally restricted to the Sámi, was expanded to Finnish settlers in the mid-18th century (Tegengren 1952). There were attempts to protect the beaver by rotating hunting areas annually, but this move was incapable of ensuring populations from efficient hunting (Pihkala and others 1986; Tegengren 1952).

The present so-called free hunting right in northern Finland on state-owned land derives from the time when hunting was an important part of the livelihood of local residents, because small-scale farming could not necessarily support people over winter. According to the free hunting right, all the permanent residents in Lapland and Kainuu can hunt within their home municipality without paying a separate license for the prey. Naturally, they have to possess a hunting license and follow general hunting laws and regulations. The right is also valid in wilderness and nature conservation areas (except strict nature reserves), and it concerns not only the descendants of local people, but also the people moving from other areas when they settle permanently in northern Finland. The free hunting right concerns all the game animals except elk (moose). Local residents also must buy permissions to hunt elk, the number of which is based on an annual census of animals. Besides elk, the main game animals are the grouse species, especially capercaillie, black grouse, and ptarmigan. Waterfowl and small predators such as red fox and pine marten are also hunted.

The Finnish Forest and Park Service (FFPS), which administers state-owned lands, sells licenses to sport hunters from other areas. These licenses are sold for commercial forests, wilderness areas, and for some nature conservation areas; however, they are not sold for national parks and strict nature reserves. The estimated number of prey has varied annually and regionally on state-owned land from 5 to 10 percent of the total number of prey (Joensuu 2001, personal communication). The paucity of prey, especially capercaillie, has led to a conflict between local and outside hunters. The decision on the number of licenses was made earlier by the Recreation Department of the FFPS, which is a profitmaking organization. Local hunters accused the Recreation Department for selling too many licenses to outside hunters, while local hunters were asked to restrict their hunting (Lapin Kansa 1998a,b). The administration of hunting issues was changed within the FFPS in 2001; now the FFPS Forestry Department is responsible for setting hunting quotas in commercial forests, and the FFPS Nature Conservation Department is responsible for setting the quotas in the nature conservation areas of each district. To keep sport hunting at a sustainable level, the FFPS aims at agreeing on the hunting quotas with local hunting organizations.

Besides legal hunting, poaching occurs within and outside the wilderness areas. In 1996, 67 cases of elk poaching were revealed in Lapland, 38 of them in the municipalities where wilderness areas are located (Nevala 1998, personal communication). In addition, game birds and large predators are common targets of poaching.

Two groups of game animals have declined considerably in Lapland during the past few decades—grouse species and large predators. The populations of capercaillie have declined steadily in the whole country since the 1960s (Helle and Helle 1991;

Helle and others 1997). Natural factors, such as weather conditions and the availability of food, influence the reproduction of birds but cannot explain the continuous decline of the capercaillie populations. Landscape-level changes caused by large-scale forestry have been shown to be one reason for the decline (Helle and Helle 1991). However, decline has also occurred in wilderness areas and national parks that are not subjected to forestry.

Increased hunting pressure is one possible reason for the decline. In northern Finland, forestry has probably caused increased hunting pressure in wilderness and conservation areas because other natural areas have decreased. Both the number of prey and the intact environment of wilderness and nature conservation areas attract hunters. For example, the main reason for local people hunting in the Urho Kekkonen National Park (30 percent of respondents) was the wilderness character of the area. The other reasons were also mainly related to the naturalness of the area, making up 65 percent of the most important reasons when combined with the wilderness character (Sippola and others 2001).

Currently, both the capercaillie and black grouse populations are low in northern Finland, including the wilderness areas, but the species are not endangered. To increase grouse populations, regional and local game management districts have recommended restricting the harvest. However, the complicated structure of hunting management and the limited possibilities for law enforcement make it difficult to regulate the number of animals killed. In practice, there are no legal tools to control the number of animals hunted, and the only efficient way is to shorten the hunting period annually. This was used, for example, in 2001, when the hunting period of grouse species in northernmost Lapland was only 11 days.

Of the large predators, the wolf is extremely endangered in northern Finland. The estimated number of animals throughout the North Calotte (northern Norway, Sweden, and Finland) is only about six to eight animals (The North Calotte Council 2001), and the wolf population of the area is dependent on the supply of animals from the Russian side of the border. The last documented reproduction of wolves in the area is from the year 1978. Usually, the fate of a wolf in the reindeer herding area is that it is killed, either legally or illegally. There has been a 5-month hunting season for wolf in the reindeer herding area in Finland, and outside of that time, it is possible to kill a wolf with special permission from the Ministry of the Agriculture and Forestry if the wolf attacked reindeer. Between 1996 and 2000, two to three wolves have annually been killed legally in Lapland (The North Calotte Council 2001). In the nature directives from the European Union, the wolf is listed as a species requiring special protection. Because the previous hunting practice did not guarantee favorable conservation status of the wolf, hunting regulations were changed in July 2001 (Ministry of Agriculture and Forestry 2001a). Since then, wolf hunting always needs permission, even within the reindeer herding area. Attitudes toward the protection of wolves seem to be negative throughout the country. In her study about the attitudes of people toward large predators in central and southern Finland, Vikström (2000) found that of all the large predators, the least sympathy was given to the wolf. Dislike and fear of wolves has deep cultural roots, based on the economic losses caused to cattle, sheep, and reindeer, and on tales, myths, lack of knowledge, and active campaigns against wolves (Pulliainen 1984).

The wolverine is also an endangered species in Finland. The population in Lapland in 1999 was about 65 animals, with a slight increase over recent years (table 1). Even though the wolverine also kills reindeer, it seems to be better tolerated than the

Table 1—The number of large predators in the reindeer herding area of Finland from 1996 to 1999. The number in parenthesis is the estimated minimum population for the whole country (sources: Kojola, I. 1998, 1999a,b, 2000).

	1996	1997	1998	1999
Brown bear	150 (770)	160 (785)	170 (795)	180 (845)
Wolf	14 (141)	10 (120)	6 (95)	9 (98)
Wolverine	62 (112)	53 (116)	64 (120)	65 (123)
Lynx	45 (790)	40 (795)	40 (810)	40 (835)

wolf. However, poaching occurs every year. Between 1996 and 2000, 11 wolverines were poached or found dead in Finnish Lapland (The North Calotte Council 2001).

The population of brown bear has increased throughout the country over the past few years (table 1). Hunting brown bear is possible within the free hunting right, but the number of animals killed during each hunting period is restricted by a quota set annually and regionally (Ministry of Agriculture and Forestry 2001b). The number of legally killed bears varied from 11 to 28 annually in Lapland between 1992 and 2000 (The North Calotte Council 2001). Hunting of brown bear has strong traditions in northern Finland, and is popular despite the relatively low number of prey. Until 1993, the hunting season for bear was in the spring. Shifting hunting season to autumn was strongly opposed by bear hunters, who found it more difficult to track bears during the snow-free period. Hunters also claim that the control of poaching was easier in spring, and many of them would like to see the return of the spring hunting season (Sippola and others 2001).

Hunting is an essential part of culture in the countryside in Northern Finland. It is the main pastime for most men, and many social structures are built around it (Ermala and Leinonen 1995; Lampio 1967). The free hunting right is one of the few privileges in the rural areas in the North, and it is highly appreciated (Sippola and others 2001). The question about limiting or repealing the free hunting right has led to strong opposition by local residents. Within the context of subsistence, there is no longer any reason for the free hunting right because the majority of hunting in the countryside is for sport. However, within the cultural context, it is very difficult to restrict this privilege. Currently, societal aspects play an essential role in the protection of game animals. The degree of success in maintaining viable grouse and predator populations depends, therefore, on the possibilities of the authorities to find common goals among different interest groups, and to get the interest groups to bind themselves to these goals.

Reindeer Herding

The law on reindeer management gives the right of free use of all land as reindeer pastures within the reindeer husbandry area (fig. 1) (Poronhoitolaki 1990). Reindeer herding and other subsistence livelihoods were mentioned as reasons for protecting wilderness areas when the wilderness legislation was prepared (Erämaakomitean mietintö 1988). Since the 1960s, however, reindeer numbers have increased considerably throughout the herding area. The main reasons for this are changes in slaughtering practices and increased winter feeding. Beginning in the 1960s, most of the young males have been slaughtered in the autumn. This allows more females to survive over winter, and the females are in better physical condition because there is less competition for food. Increased winter feeding with hay and commercial forage also improves winter survival (Helle and Kojola 1993; Kojola and Helle 1993). Winter feeding has not been commonly used in wilderness areas, but over the past few years, hard snow and ice conditions have forced herders, for instance in western Lapland, to feed reindeer in the wilderness (Helle and Timonen 2001).

Another reason for winter feeding is that the pastures are heavily overgrazed in many areas. There are contradictory results on the effects of reindeer herding on biodiversity. To summarize those, it seems that moderate grazing increases the diversity of plants and soil invertebrates, while heavy grazing is detrimental to both (Kojola and others 1998; Suominen and others 1998). Reindeer grazing also prevents the regeneration of birch forests, modifying forest structure (Helle and others 1998; Mäkitalo and others 1998). In the 1960s, a large-scale natural outbreak of autumnal moth (*Epirrita autumnata*) caused defoliation of mountain birch forests over several thousand square kilometers in Finnish Lapland, mostly in current wilderness and nature conservation areas. Reindeer grazing has prevented regeneration of birch by shoots, and it is probable that parts of these areas will become barren mountains due to the heavy grazing pressure (Helle and others 1998).

Reindeer numbers have been reduced by the Ministry of Agriculture and Forestry during the last few years (Filppa 2000). However, reindeer have been part of the nature of Fennoscandia for thousands of years. At what point the natural effect of reindeer grazing is exceeded, remains a question. The present system of herding cooperatives, in which many cooperatives have a relatively small land area and the



Figure 1—The Finnish wilderness areas and the reindeer husbandry area.

areas are separated from each other by fences, does not allow traditional herding, which was to move reindeer between summer and winter pastures and to rotate winter pasture areas. In addition, the economic basis of this means of livelihood has changed radically over the past few decades. The decrease of winter pasture areas due to other forms of land use, the use of motor vehicles in herding and gathering of reindeer, additional winter feeding, and new requirements to concentrate slaughterers in slaughterhouses have all increased expenses. Under these circumstances, reindeer owners would prefer to increase rather than decrease their number of reindeer.

The interests of reindeer herders conflict with the goals to preserve viable populations of large predators. The compensation paid to herders due to predator killings has increased from about FIM 2 million in 1990, to about FIM 10 million in 1999 (The North Calotte Council 2001). In 1998, the approximate percentages of reindeer killed by different predators were: wolverine 51 percent, brown bear 23 percent, golden eagle 14 percent, wolf 6 percent, and lynx 6 percent (Norberg 2001, personal communication). The present, relatively reliable estimates of predator populations start from 1996, when the amount of compensation was about FIM 8 million. Since then, only the brown bear has increased their numbers in the reindeer herding area (table 1). Most of the increase in compensation is due to wolverines (Norberg 2001, personal communication). Part of the increased losses in Western Lapland may be due to the increased wolverine population on the Norwegian and Swedish side of the border, where the reproduction of the wolverine increased from about 32 to about 80 from 1992 to 2000 (The North Calotte Council 2001). However, compensation due to losses is based on the reports by reindeer owners, and the real causes of death are seldom known. Thus, there may be cases in which reindeer have

died from starvation, but they have been reported as having been killed by predators. On the other hand, all the losses by predators will never be revealed, herders are not compensated for expenses incurred when seeking dead reindeer, nor are the losses compensated in full (Särkelä, personal communication). The development of the compensation system is a necessary step if viable predator populations are to be maintained within the reindeer herding area. Since 1997, the losses brought about by the golden eagle have been offset through payment based on the number of nesting eagles within the area of each herding cooperative. This might be a new way of approaching the predator question, but it is too early to judge how well the new system works.

Forestry

Forestry is permitted in the most productive parts of the pine-dominated forests in six wilderness areas. Logging in wilderness is related to the economic history of Finland. Forestry has been the economic backbone of Finland since the beginning of the 20th century. Because of long transport distances, the northernmost areas of the country remained outside forestry operations until the 1960s when a pulp mill was built in Kemijärvi in Central Lapland (Lehtinen 1991). This opened the northernmost forest areas to logging, and started the rapid fragmentation of the remaining wilderness areas (Lehtinen 1991; Oinonen 1993). The plans to cut down the last large pristine forests in northern Lapland, especially in the Kessi (Vätsäri) area in the 1980s, created the wilderness movement. In fact, part of the Kessi area had been subjected to logging as early as the 1920s, when part of the area was selectively logged and the logs were floated into the Arctic Ocean (Metsähallitus 1999). However, Kessi became a symbol of the wilderness movement, which aimed at protecting the remaining wildernesses (Lehtinen 1991). A committee was established by the Government to solve the issue. The Government had given the Committee the task of creating a unanimous proposal for wilderness protection. Thus, a compromise among interest groups included allowing logging in some forest areas within the newly established wilderness (Erämaakomitean mietintö 1988). Currently, logging is underway in restricted areas in the Hammastunturi Wilderness, but plans exist for all six areas.

One of the major effects of forestry is fragmentation. In some areas, such as the Hammastunturi and Kemihaara Wildernesses, the planned forestry operations would divide the wilderness areas into two parts (Metsähallitus 1994, 1996). Even though there are no plans to construct permanent roads to the logging areas, temporary roads and bridges would increase fragmentation and attract more people to the areas, causing increased disturbance. The effects of fragmentation are often hard to detect, and they can influence different levels of ecosystems, varying from micro-environments to the landscape level, and from individuals to populations (Haila 1994).

Species respond to logging in different ways, depending on their environmental requirements. The bird species most affected by forestry are the hole-nesting species and sedentary birds that are confined to old-growth forests. Evidence of their decline has been obtained in studies where the species compositions of birds have been compared between pristine and logged forests near the wilderness areas (Jokimäki and Inkeröinen 1995).

Another affected species group are species that inhabit decaying wood. These include many invertebrates and wood-decomposing fungi. In studies where the species composition of wilderness forests were compared with those of regeneration areas, polyporous fungi inhabiting large-diameter and well-decayed trunks had mostly disappeared from the regeneration areas, where recruitment of new large-diameter tree trunks was disrupted (Sippola and Renvall 1999). In addition, many beetle groups, especially those inhabiting different microfungi, were absent or low in numbers at the logged sites (Sippola and others 2002). For many insects and polyporous fungi, the lack of suitable substrate seems to be the restricting factor for their survival, but some are also sensitive to the microclimatic changes caused by logging. Polyporous fungi, which are commonly used in forest inventories as indicators of the conservation value of an area (Kotiranta and Niemelä 1996), usually react relatively slowly to environmental changes, especially in northern boreal forests where

decomposition is slow. Thus, the real effects of logging may be detectable only several decades after logging (Sippola and Renvall 1999). Although logging in wilderness areas may cause the extinction of local populations, they are unlikely to cause species extinctions on a regional scale. However, our knowledge on the distribution of many lower plants and animals in northern regions is incomplete, and we do not know exactly the species composition and conservation value of all the areas.

Conclusions

As the examples above show, the modern use of wilderness often has deep roots in history. Inevitably, current practices in wilderness areas have many detrimental effects on biodiversity. Besides the forms of use dealt with above, tourism, mine prospecting, and even fishing may affect species and populations. The challenge of management is to regulate the extent and severity of these effects so that viable populations of all native wilderness species can be maintained. In Finnish wilderness areas, the main obstacles to preserving species and habitats effectively may be listed as follows:

1. Lack of goals for biodiversity conservation in legislation.
2. Complicated legislation and management organizations regulating different forms of use.
3. Lack of trust between authorities, stakeholders, and interest groups.
4. Insufficient possibilities for local participation.

Many of these problems have been recognized by the Forest and Park Service, which administers wilderness areas. It has been noted that the wilderness legislation prevents some human activities that radically alter the environment, for example, forestry (except in the restricted forestry areas), mining, and road construction. However, the legislation does not provide a basis for species protection, and the goals for species preservation must be set on the basis of general nature conservation legislation (Metsähallitus 1994, 1999). The complicated relationships between different laws have also been analyzed in connection with management planning (Metsähallitus 1994, 1999), and local participation has been increased.

Some of the problems, such as those concerning the more efficient regulation of hunting and fishing, could be improved by further clarification of local and immemorial rights, by simplifying management systems at the national, regional, and local level, and by more efficient law enforcement. One of the most difficult questions is how to maintain viable populations of large predators, especially wolves. One approach would be to reconsider the compensation system for reindeer losses, basing it on the number of living predators within the herding areas. However, in the case of mammal predators, which may move long distances within a short time, creating an effective and equitable compensation system may be difficult (Kojola 2001, personal communication). The management situation in northern Lapland is further complicated by the Sámi land claims. If Sámi land ownership is also recognized, the management responsibilities might shift to Sámi organizations. Whether this would happen or not, commonly set goals, local participation, common responsibility in resource use, and building trust between different actors are essential tools in maintaining biodiversity in wilderness areas in the future.

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Anthropogenic Impacts on Habitat Structure and Species Richness in the West Siberian Arctic

Olga Khitun
Olga Rebristaya

Abstract—Intensive technogenous invasion in the West Siberian Arctic during the last two decades in connection with gas and oil exploration, along with the constant growth of domestic reindeer herds, has caused dramatic changes in arctic ecosystems. Loss of biodiversity on the species level has not yet been documented in the region on a whole, but changes in ecosystems in intensively exploited areas are obvious. The absence of some plant species and the disappearance of rare bird species surrounding the Bovanenkovo Gas Field in central Yamal is likely the result of technogenous destruction of their habitats. Length of recovery for different habitats varies greatly. Only about 40 percent of local flora can colonize anthropogenic habitats. Habitats such as well-drained southern slopes occupied by herbaceous meadows, willow copses in the flood plains, coastal marshes, and isolated outposts of trees contain the largest amount of rare species. These are mainly relics of the past, while at the same time are the most vulnerable to disturbance. They should be of special concern. Nature reserves in the region are not representative enough and are not practical in function.

Introduction

Different sectors of the Arctic vary in terms of geological history, formation of biota, and land-use history. The Yamal-Gydan region (namely Yamal, Gydansky, and Tazovsky Peninsulas) is one of the most inaccessible and sparsely inhabited parts of the Arctic. It spreads northward from the Polar Circle for more than 750 km (466 miles). The total area of the three Peninsulas is about 235,000 km² (90,734 miles²). Compared to other sectors of the Russian Arctic, the Western Siberian North has remained untouched by industry until quite recently. Ignoring the extreme fragility and slow regeneration of these ecosystems, along with specific cryological conditions, has led to extensive destruction of plant cover during a short period.

The West Siberian sector of the Arctic is a low plain with flat or gentle rolling relief, and numerous lakes and rivers. It lacks many types of habitats present in other sectors of the Arctic. An absence of exposed bedrock and the presence of a thick layer of Quaternary deposits (clay, clayey and sandy grounds) are typical for this sector. Construction work here is difficult due to fine-grained sediments, high (up to 70 percent) ground ice content, presence of ice wedges and lenses (Sisko 1977). Anthropogenic and natural disturbances of insulating plant and peat cover trigger natural exogenic processes and cause intensive thermodenudation. Ice-rich, steep banks of Baidaratskaya Bay are destroyed and retreat up to 5 m (16.4 ft) per year (Tummel and Zotova 1996). The climate is rather severe, with average July temperatures varying from 11 °C (51.8 °F) in the southern hypoarctic tundra to 5 °C (41 °F) in the arctic tundra subzone, and average January temperature changes in longitudinal direction from -23 °C (-9.4 °F) in the west to -28 °C (-18.4 °F) in the east (Sisko 1977). Climatic conditions make revegetation of disturbed sites very slow. There are also widespread acidic soils and swampy areas.

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History of Traditional Land Use

The ancient hunters of marine mammals and wild reindeer appeared in this region more than 2,000 years ago. In the 10th to 12th centuries A.D., they were replaced by ancestors of modern Nenets—Samodian Tribes of the Altay-Sayan origin. As a result, sledge reindeer husbandry became the main occupation, and hunting and fishing lost their primary importance (Krupnik 1989).

The first Russian pioneers also appeared in the Siberian North in the 11th to 13th centuries. In the 13th to 16th centuries, colonization of the Arctic coast and exploration of the Northern Sea Route began. Since the 15th century, there was a trade route from Baidaratskaya Bay to Obskaya Bay through central Yamal. Some intensification of hunting occurred after Russian traders and hunters came into the area, but on a whole, human influence was very limited. The effect of domestic reindeer at that stage was not destructive due to the relatively small size of the herds (less than 100 animals) and rather long period of circulation. Rapid growth in the number of domestic reindeer started near the end of the 18th century (Krupnik 1989). By the beginning of the 20th century, the total number of domestic reindeer in the region (including forest-tundra) reached 247,000 head (Zhitkov 1913). Corresponding changes in plant cover and productivity occurred (Govorukhin 1933; Zhitkov 1913). The negative effect of the traditional economy on northern ecosystems is also connected with cutting of trees for firewood and tools during nomadic migrations, which caused a gradual retreat of the tree line to the south in regions with reindeer husbandry (Krjuchkov 1994). In Yamal, we found old larch stumps (*Larix sibirica* L.) almost 100 km (62 miles) to the north of the modern tree line. In the Gydansky Peninsula, we observed changes in drainage and swamp development in habitats where alder or willow shrubs were cut down for wood. But on a whole, traditional knowledge let people live in harmony with nature for centuries.

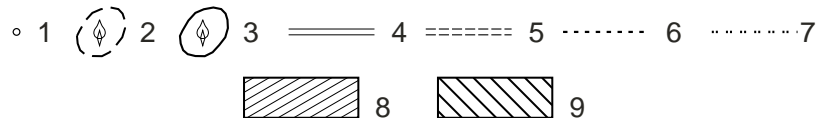
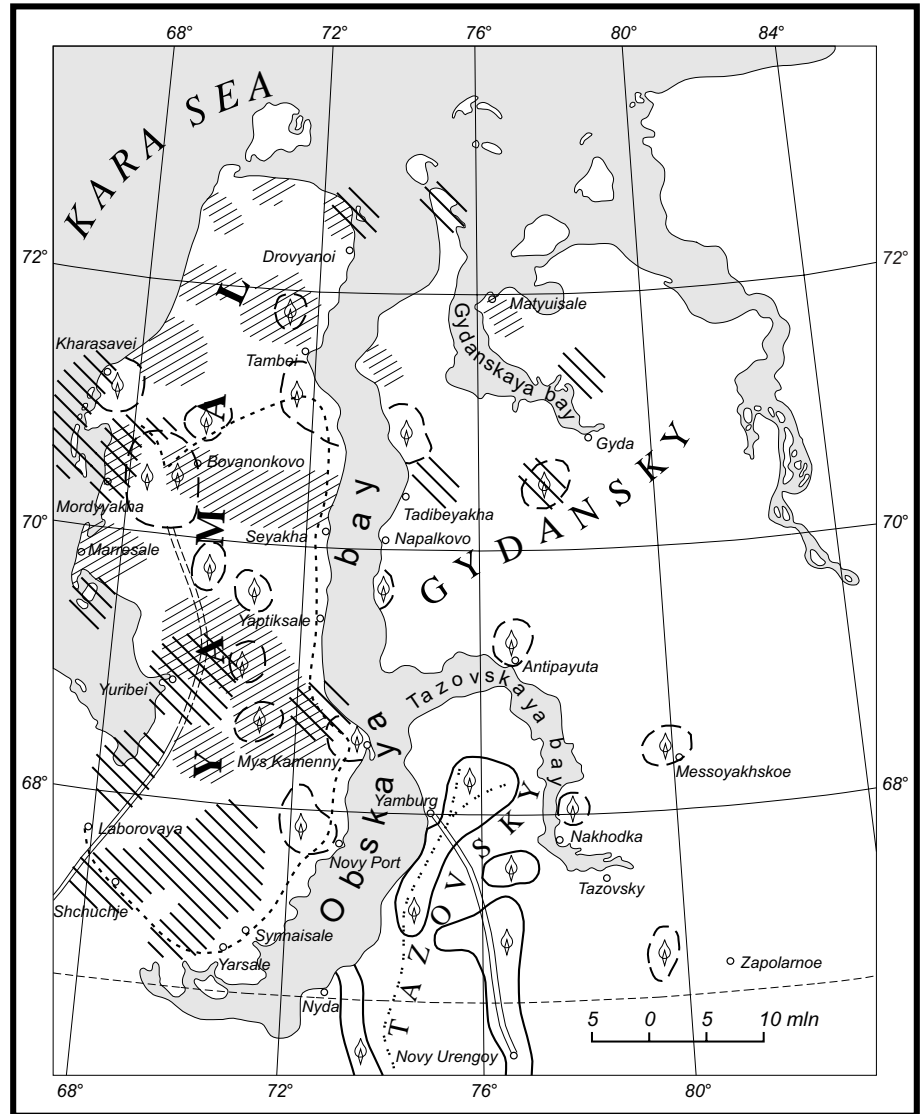
In 1949, a decision was made by the Soviet Government to put an end to the nomadic way of life (Decree of Council of Ministers of Russian Federation No. 595 of 26.07.1949). It resulted in reorganization of collective farms into state farms and redistribution of pastures. Traditional ways of nomadic migrations were changed. At the same time, the number of reindeer steadily increased, especially in the last two decades, mainly due to the growth of private herds. In Yamal, the number of domestic reindeer from 1976 to 1980 was 131,600 head, including 50,700 privately owned animals, whereas from 1990 to 1995 it reached 177,400 head, including 97,200 privately owned (Korytin and others 1995a). This amount exceeds twice the potential reindeer carrying capacity of summer, and especially winter, pastures (Bykova 1995). This situation led to overgrazing, trampling, exhaustion, and delichenization of pastures, and changes in the structure of plant cover. In southern and central Yamal and Tazovsky, lichen-dominated tundras have been replaced by moss-dominated tundras with increased portions of grasses (Khitun 1997). More than 50,000 km² (19,305 miles²) of lichen pastures were destroyed in southern and central Yamal by the 1990s (Bykova 1995). The situation is worsened by the withdrawal of lands by the gas and oil industry. The Bovanenkovo Gas Field in central Yamal occupies 151,000 ha (370,658 acres), 127,000 ha (313,824 acres) of which were pastures once belonging to the Yarsalinsky State Farm (Korytin and others 1995a). Another traditional branch of the economy—hunting—has almost lost its importance nowadays due to a decrease in game population and low state prices, whereas fishing remains important—almost one-third of the world's white fish catch is supplied by this region (Korytin and others 1995a). Several fish-processing factories are located in southern Yamal.

Effect of Gas and Oil Exploration on Natural Ecosystems

In the 1930s, industrial exploration started in different parts of the Russian Arctic, but Western Siberia remained almost intact until the 1970s. Due to an intensive geological survey, more than 20 important hydrocarbon layers were found in the area, mainly in Yamal and Tazovsky, and some infrastructure was built (fig. 1). Development of the Yamal gas fields, containing about 10 trillion m³ of gas reserves (Korytin and others 1995a), is planned for the near future. Already the disturbed areas have reached 0.14 percent of the total area in Yamal, and in Tazovsky where

Figure 1—Industrial land use and localities of wildlife concentration in the West Siberian Arctic.

Legend: 1 = permanent settlements and trading posts; 2 = gas fields under geological prospecting (compiled from Bykova 1995); 3 = gas fields under exploitation; 4 = railroad under exploitation; 5 = rails under construction; 6 = winter roads; 7 = pipeline under exploitation; 8 = places of increased abundance of polar fox dens (compiled from Korytin and others 1995; our data for Gydansky); 9 = territories of concentration of rare bird species (compiled from: Ryabitzev 1993; Zhukov 1998; our personal observations for Gydansky).



the Yamburg Gas Field is under exploitation, this figure has reached 1.5 percent (Bykova 1995) and is estimated at 6,000 to 7,000 km² (2,300 to 2,700 miles²) in the region (Krjuchkov 1994). A lack of appropriate machinery and advanced technologies, plus environmental unawareness, were the reasons that the West Siberian Arctic appeared at the edge of ecological catastrophe (Forbes 1999; Khitun 1997). Newcomers did not know local conditions, were not aware of traditional and natural values, and intended to leave these places in the near future. Hence, their behavior included: uncontrolled use of heavy tracked vehicles (officially forbidden in the summertime since 1989, but there have been numerous violations until recently); barbarian recreational hunting and fishing without recognition of breeding or spawning periods; spreading of rubbish all over; conflicts with indigenous population; and an increase in anthropocological tension.

The main types of disturbances connected with industrial activities in the West Siberian Arctic are offroad vehicle movement, winter roads, exploratory drilling, sand excavation, pipeline and railway construction, temporary camps, settlements, and gas-condensing complexes (Khitun 1997). During the last few years due to the

difficult financial situation of the country, construction work in Yamal was “frozen” or went on slowly, but now several international projects to exploit Yamal’s gas and to construct several pipelines are being discussed (Forbes 1999). A new wave of intensive technogenous impacts may reach Yamal again soon.

Habitat Diversity and Stability to Mechanical Impact

Due to its relief and geology, the West Siberian Arctic lacks many habitats, nevertheless we distinguish there 23 habitat types (Khitun and Rebristaya 1998). They differ by species richness, area, and resistance to mechanical impact (Rebristaya and others 1993). Interfluvial plateaus; convex, slightly elevated surfaces on river terraces; shallow depressions between hills; long, gentle foothills; and lake depressions with tundra communities are relatively stable to anthropogenic impact and have potential for self-recovery. Gentle slopes with low shrub-dominated tundra, wet meadows and bogs in flood plains, and polygonal bog complexes are weakly resistant to impact, but have a relatively high potential for self-recovery. Convex marginal parts of hilltops (especially on sands); mineral mounds; steep, sandy, short slopes; steep, well-drained slopes of hills; high riverbanks; deep ravines; and high shrub thickets on the slopes are unstable and dangerous for exploitation, with the possibility of escalation of erosion and denudation.

Responses of Plant Communities to Disturbance and Rate of Recovery

The natural ability of different plant communities to recover after one to several passages of tracked vehicles was studied in the surroundings of the Bovanenkovo Gas Field in central Yamal 6 years after the impact occurred (Khitun 1997; Rebristaya and others 1993). Responses of plant communities depended on moisture conditions and intensity of impact (fig. 2). Mesic tundra was rather tolerant from one to three passes of a tracked vehicle, whereas in sedge wet meadows, sphagnum bogs, and willow copses, plant cover was severely disturbed even after one passage. Wetlands had rather high restoration ability due to the abundance of plants with high regeneration potential (rhizomatous, with dormant buds and fast-growing shoots), and after 5 to 6 years may even have a higher total cover due to increased sedge cover. No community can survive numerous passages.

The most dramatic effect was on shrub-dominant vegetation. Multiple passage tracks were colonized with horsetail (*Equisetum arvense*), alpine meadow bistort (*Polygonum viviparum*), sedge (*Carex concolor*), and willow (*Salix glauca* and *S. lanata*) shoots. Mosses from adjacent natural communities (*Drepanocladus uncinatus*, *Plagiomnium medium*, *Aulacomnium palustre*, and *A. turgidum*) spread along with pioneer mosses (*Ditrichum cylindricum*, *Anisothecium vaginale*, and *Bryum* sp.). If wet peat is exposed, horsetail, Arctic dock (*Rumex arctica*), bluegrass (*Poa alpigena*), bulblet saxifraga (*Saxifraga cernua*), tall Jacob’s ladder (*Polemonium acutiflorum*), frigid coltsfoot (*Petasites frigidus*), *Stellaria crassifolia*, and later cloudberry (*Rubus chamaemorus*) are successful colonizers.

Zonal dwarf-birch-willow-graminoid-lichen-moss communities on the interfluvial plateaus do not resist numerous passages of heavy vehicles and recover slowly. After 5 years, less than 5 percent of the track was revegetated by reed-grass (*Calamagrostis holmii* and *C. lapponica*), foxtail (*Alopecurus alpinus*), hairgrass (*Deschampsia glauca*), and *Carex arctisibirica*. On an abandoned (20 years prior to our survey) transportation corridor with altered drainage, cottongrass dominated the community, with *Carex arctisibirica*, foxtail, bluegrass, Arctic dock, alpine meadow bistort, and willows making up a total projective cover of up to 100 percent. Frost-boiled tundra with prostrate dwarf-shrubs on the plateau edge was the most resistant, but when finally disturbed, especially if the tractor made a turn, practically no revegetation was noticed due to the dryness of the substrata. Similar responses were found on steep slopes with dwarf-birch-grass-moss tundra where the native vegetation was totally damaged. Deflation was recorded in these two habitat types. Recovery in such habitats takes dozens of years.

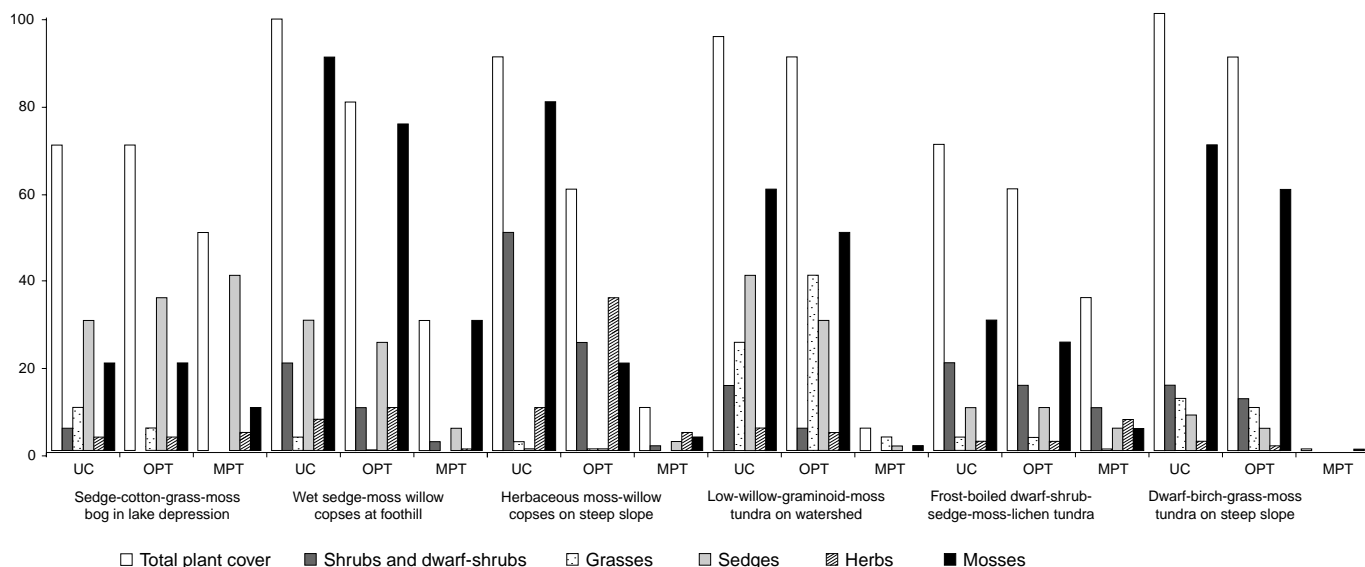


Figure 2—Responses of different plant communities along a mezotopographic gradient to disturbances of different intensity in central Yamal: UC = undisturbed community (control); OPT = one-pass track; MPT = multiple-pass track. Observations were made 5 to 7 years after impact.

Restoration Potential of Yamal’s Flora

Recovery after anthropogenic disturbance in the West Siberian sector of the Arctic is at the expense of local flora. Sixty species (about 40 percent of local flora) were found to colonize disturbed sites in central Yamal, and 76 species (41 percent of local flora) in the surroundings of the Yamburg Gas Field on the Tazovsky Peninsula (Khitun 1997). In the eastern part of the Arctic, such sets of species are more diverse: 125 in the surroundings of Vorkuta (Druzhinina and Zharkova 1979) and 169 in the coastal part of Bolshezemelskaya tundra between the settlements of Indiga and Amderma (Gruzdev 1990). According to the scale proposed by Yurtsev and Korobkov (1979), only 8 percent of local flora in central Yamal belongs to the group of active colonizers, which is half that in the surroundings of Vorkuta (Druzhinina and Zharkova 1979). The majority of species found in disturbed sites plays a very small role in site recovery.

Sets of species colonizing natural and anthropogenic disturbances are very similar, and arctic (*sensu* geographic element) species prevail in them. Disturbances resulting in partial or complete destruction of the organic layer changes soil pH from strongly acidic to almost neutral, and mineralization of the substrata causes edaphic conditions more favorable for the arctic species. In this sector, they even spread to the south by anthropogenic disturbances: Arctic camomile (*Tripleurospermum hookeri*) in the south of Yamal can be found only in transportation corridors. Boreal elements play important roles in the flora on a whole, but compared to the European sector of the Arctic, where the phenomenon of borealization was discovered (Gruzdev 1990), in Yamal and Tazovsky the increase of boreal species was not significant in disturbed habitats.

On the Tazovsky Peninsula, the boreal element in local flora on a whole reaches 25 percent, and in the set of species found in anthropogenic habitats it is 18 percent. In central Yamal, it comprises 9 percent, both in local flora and in flora of disturbed habitats. This information is important for planning reclamation work. Numerous experiments failed because the wrong seed mixtures (the same boreal grasses as in less severe climatic conditions in Vorkuta, Bolshezemelskaya tundra) were used. Only local species, mostly representing the arctic element, may hold potential for successful restoration. We suggested different sets of species for restoration on different grounds—sands, loams, and peaty wetlands (Khitun and Rebristaya 1997)— including not only grasses, but different herbs and local willows. The presence of a severe climatic barrier prevents the penetration by weeds. Compared to

the East-European Arctic, sinanthropization, or the spread of adventitious species, has not been recorded in central Yamal. But in the southeast part of the Peninsula, along the railway (fig. 1), dispersion of chickweed (*Stellaria media*), penny-cress (*Thlaspi arvense*), shepherd's ruppe (*Capsella bursa-pastoris*), lamb's quarters (*Che-nopodium album*), and common knotweed (*Polygonum aviculare*) seems possible, as they are already present in the nearby towns of Labytnangi and Salekhard. Although the number of species in secondary communities increases due to such species, in the long term they may have a negative effect by replacing some native species.

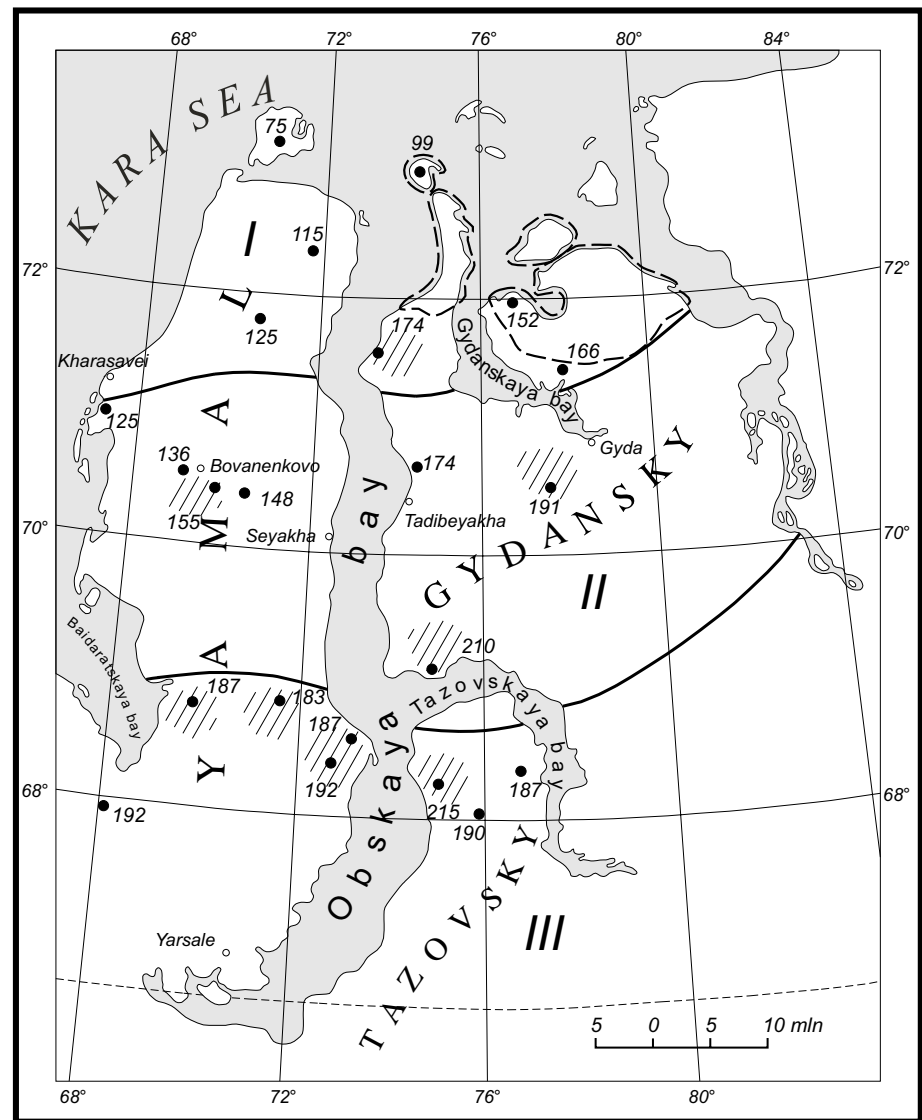
Biodiversity of the West Siberian Arctic

Flora

Species Richness—The territory studied is the Yamal-Gydan subprovince of European-West-Siberian Province of the Arctic floristic region (Yurtsev 1994). It spreads through three botanical-geographic subzones (Yurtsev 1994): southern hypoarctic, northern hypoarctic, and arctic tundra (fig. 3). Floristically, this sector

Figure 3—Subzonal division and species richness of local flora in the West Siberian Arctic.

Legend: 1 = settlements; 2 = study sites; arabic figures = number of species in the local flora; 3 = borders of subzones (Yurtsev 1994); 4 = borders of Gydansky Nature Reserve (from: Kalyakin and others 2000); 5 = areas of concentration of rare relic plant species.



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of the Arctic is one of the poorest (Khitun and Rebristaya 1998). There are 405 species of flora in Yamal, with 88 of them found only in the southernmost part of the Peninsula (Rebristaya 1998); flora of the Tazovsky Peninsula—274 species (Rebristaya and others 1989), and in the tundra part of the Gydansky Peninsula (which is still very poorly investigated) about 400 species are found (Khitun 1998). The West Siberian Arctic is characterized by an absence of many species, with disjunction in their ranges. Several arctic-alpine species found in arctic tundras of the Gydansky Peninsula are absent or very rare in Yamal, but they occur in Taymyr and in the Bolshezemelskaya tundra (Khitun and Rebristaya 1998). This reflects both the history of the region and a topography that is a monotonous lowland. Several marine transgressions during the Pleistocene era destroyed vegetation, and the revegetation occurred through migrations (Sisko 1977). Consequently, obligate sea-shore halophytes (*Carex glareosa* and *Carex maritima*) are present in the inner parts of the Peninsulas, and are indicative of exposed salted horizons. Wide distribution of hypoarctic species, as well as some boreal species, was favored by the spread of acidic peat soils, which, in contrast, are not suitable for most arctic species.

The main objects of our investigations in the area are the local floras, in other words, floras of geographic localities with areas about 100 km² (39 miles²). Study areas differ in species richness; for example, in Yamal they generally contain fewer species than in Gydan (Khitun and Rebristaya 1998). There is also a clear tendency toward decreased species richness to the north (fig. 3) due to dropping out of boreal and hypoarctic species with little enrichment by the arctic element coming from the east, particularly in Gydan, less in Yamal.

Rare Species—Many rare species in the flora of the West Siberian Arctic are relics of the past: *Saxifraga cespitosa* and *Gastrolychnis apetala*—of the mid-Pleistocene; *Dianthus repens*, *Carex supina*, *Koeleria asiatica*, and *Cerastium maximum*—of the late Pleistocene tundra-steppe complex; *Rhodiola quadrifida* and *Saussurea alpina*—periglacial relics of the same age; and amphiatlantic species *Gnaphalium supinum*, *Epilobium davuricum*, *Veronica alpina*, and *Sibbaldia procumbens*—relics of the Boreal humid period of the early Holocene. During warm periods of the Holocene, larch (about 8,000 to 9,000 years ago) and birch-spruce (about 5,000 to 7,000 years ago) forests expanded up to 400 km (249 miles) north of the current tree line (Khotinsky 1977). This explains a relatively large portion of the boreal element in the flora of the West Siberian Arctic (Rebristaya and Khitun 1994). Some herbaceous species left after the retreat of the taiga forest and survived in altered climatic conditions—*Linnaea borealis*, *Orthilia obtusata*, *Pyrola minor*, *Trientalis europaea*, and *Adoxa moschatellina*. There are only two neo-endemic species in the flora of the West Siberian Arctic—*Castilleja arctica* and *Pedicularis hyperborea*, and one subendemic—*Crepis nigrescens*. *Castilleja arctica* is included in the Red Data Book of the Russian Federation (1988). Fifteen species are listed in the Red Data Book for the Yamal-Nenets National District (Dobrinskii 1997), including both endemics. Although this list includes several species rather common to the area, such as *Polemonium boreale*, *Myosotis asiatica*, and *Parrya nudicaulis*, it does not contain some relics very rare for this region (*Carex holostoma*, *C. maritima*, *C. supina*, *Primula stricta*, *Erigeron silenifolius*, and *Draba sibirica*) found specifically in one or two localities.

Importance of Habitat Conservation—Most of the species mentioned above as rare are stenotopic and occupy a narrow ecological niche. The main danger for them is disappearance or transformation of their habitats. Warm, steep, well-drained slopes with meadowlike vegetation are shown to contain the greatest number of rare species (Khitun 1998; Khitun and Rebristaya 1998). Foothills with nival conditions and certain mineral enrichment, shrub thickets in flood plains, and coastal marshes also contain many rare species. These habitats occupy a relatively small part of the territory and are spread sparsely. They demand special conservation control, which is absolutely absent now.

Deterioration of habitats has led to the disappearance of rare species. Unfortunately, we cannot prove it because no floristic research was done in the Bovanenkovo Gas Field area before its exploration started. However, it is very likely that the absence of some species in the local flora is the result of habitat deterioration. We did not find the 20 species there that are present in the nearby, more or less intact, local flora (Khitun 1997). Many of these species (*Arnica iljinii*, *Castilleja arctica*,

Linnaea borealis, *Draba sibirica*, *Viola biflora*, and *Erigeron eriocalyx*) occur on steep, warm slopes. Many of their possible habitats in Bovanenkovo were deteriorated, both by natural cryogenic landslides and by erosion triggered by anthropogenic mechanical disturbances. This is similar to what we found in the Tazovsky Peninsula. Local flora of the Laiyakha River mouth includes 215 species, whereas 15 km (9 miles) to the south, in heavily disturbed surroundings of the Yamburg settlement, we found only 190 species.

Wildlife

Decrease in Number—Hunting pressure on game animals in the West Siberian Arctic has increased during the last centuries. Reindeer husbandry and the migration of huge herds of domestic reindeer cause disturbance to the natural habitats of some animals and birds. During industrial exploration, deterioration and fragmentation of wildlife habitats caused the migration and disappearance of certain species in some areas, especially in Yamal and Tazovsky. The situation in the Gydansky Peninsula remains satisfactory, as there is no industrial activity at present. Poaching and exploitation are big dangers for wildlife in the areas surveyed. Species diversity has not decreased yet, but the condition and size of populations of some animal and bird species are cause for concern.

Fish—Development of the gas and oil industry in the West Siberian Arctic resulted in pollution of the Ob river embayment and the Kara Sea shelf by oil products and other chemical contaminants, with subsequent detrimental effects on fish catches and destruction of spawning areas (Shishmarev 1988). Populations of gwyniad and surgeon fishes are decreasing because of catching pressure in vicinities of exploration areas. A decrease in number and change in age structure of previously numerous muksun (*Coregonus muksun*) and chir (*Coregonus nasus*) has been recorded in the delta of the Mordyyakha River, clearly connected with exploration of the Bovanenkovo Gas Field (Bogdanov and others 1995). The population of muksun in Mordyyakha is listed in the regional Red Data Book (Dobrinskii 1997).

Mammals—There are 26 species of animals in the West Siberian Arctic, but many of them visit the territory sporadically or are restricted to the southern border. Findings of polar bear skulls at Nenets sacred sites in the north of Yamal give evidence that these animals were fairly numerous in this region (Uspenskii 1983). Currently, they sometimes visit the northern coasts of Yamal and Gydan and the surrounding islands. They have been strictly protected since 1956. Reindeer (*Rangifer tarandus*), polar fox (*Alopex lagopus*), two species of lemmings (*Lemmus sibiricus* and *Dicrostonyx torquatus*), and Middendorf's vole (*Microtus middendorfi*) have been an autochthonous part of the fauna in the region since the Pleistocene. Another important part of the fauna is a group of species with a very broad intrazonal distribution, such as fox (*Vulpes vulpes tobolica*), wolf (*Canis lupus albus*), wolverine (*Gulo gulo*), ermine (*Mustela erminea tobolica*) and weasel (*Mustela nivalis*). The wolf population is controlled by hunting (mainly by Nenets people). The total number of animals does not exceed 500, and their density was reported to be less than one per 1,000 km² (386 miles²) (Bibikov 1994). Wolverines are even less numerous. Red fox, ermine, and otter are mainly restricted to larch forests or high shrub thickets in the flood plains in the south of the Peninsulas and are not numerous. In the period of greatest fur trapping in Yamal, in the 1950s, up to 2,700 pelts of ermine were obtained, but at present the number of this precious animal has declined sharply (Korytin and others 1995b). Forest mammals (brown bear, moose, and hare) penetrate into the southern part of the region.

The domestic reindeer plays the most important role in the functioning of Yamal-Gydan tundra ecosystems and has almost totally replaced its wild relative. Since the 1910s, the southern limit of the distribution of wild reindeer has gradually shifted to the north along with the growth of domestic herds. A population of wild reindeer exists only on Belyi Island and in the northernmost parts of Yamal and Gydansky, with around 1,000 animals (Syroechkovsky and Kuprianov 1995). In the Soviet period, the wild reindeer were referred to as an enemy to reindeer herders and was intensively hunted. The number of wild reindeer rapidly decreased in the region from 8,000 head in the 1930s (Tyulin 1938) to 300 to 400 by the 1970s (Skrobov 1975). It is listed in the regional Red Data Book (Dobrinskii 1997).

Polar fox is the most numerous predator and the most valuable fur-bearing animal in the region. Respectively, it is an object of intensive hunting, both by locals and newcomers. Polar fox is spread all over the region, and the limit of its breeding area is constantly shifting to the north. The breeding area has shifted 140 km (87 miles) compared with its position in the 1930s, possibly reflecting climate warming (Korytin and others 1995b). Den abundance varies from 1.3 to 3.3 per ha (Korytin and others 1995b). Several areas with increased abundance of dens were found in Yamal (fig. 1). There is no such data for Gydansky, but in some of the areas where we made our floristic investigations we also found high den abundance. In Yamal, these areas occupy about 34 percent of the breeding zone, but as the main places of polar fox reproduction, they are very important for the viability of the population. Disturbance of natural conditions in such areas are especially dangerous for the Yamal polar fox population. Unfortunately, the Bovanenkovo Gas Field lies within one of such areas. In the early phases of its intensive development, 13 percent of Arctic fox dens were destroyed by different industrial activities and by uncontrolled offroad movement of tracked vehicles (Dobrinsky and Sosin 1995). The number of polar foxes follows the cyclic fluctuations in the number of their main prey—lemmings. The dynamics of state pelt output in Yamal-Nenets Autonomous District shows a decline since the mid-1970s. Unfortunately, those figures could not show the complete picture because part of the pelts during the last 20 years have gone to the black market. The absolute peak in the number of polar foxes was in the mid-1950s, when pelt output reached 41,000. The lowest pelt output was in the mid-1920s and in the beginning of the 1980s. In the latter case, it was less than 5,000, but by the beginning of the 1990s it increased to 18,000 (Korytin and others 1995b). For the preservation of Yamal's polar fox, a system of strict measures against poaching is absolutely necessary, as well as protection (in terms of prohibiting industrial activity) of the areas with high den abundance.

Birds—More than 180 species of birds are recorded within this sector of the Arctic, but only about 80 species have their nesting areas within the tundra zone (Ryabitzev 1993; Zhukov 1998). Waterfowl are the most numerous. Flood plains with numerous small lakes and shrub thickets are the most species-rich habitats, whereas on watersheds only few bird species occur. There are several rare bird species listed, both in the regional and federal Red Data Books, including: the White-beaked Diver (*Gavia adamsii*), Tundra Swan (*Cygnus bewickii*), Red-breasted Goose (*Branta ruficollis*), and Peregrine Falcon (*Falco peregrinus*). At the end of the 1960s, molting Tundra Swans would concentrate along the west coast of Yamal in the mouths of big rivers (Uspenskii and Kishinskii 1972), but in 1980 along with industrial exploration in those areas, the birds disappeared (Mineev 1987). They probably migrated to more secure places. The White-fronted Goose (*Anser albifrons*) is one of the most common species, with average nest density from 0.05 to 0.4 pairs per km² (Ryabitzev 1993), and occupying a wide range of habitats: swampy plains, shrub thickets, ravines, and eroded riverbanks. Though groups of molting geese can be met in different parts of Yamal, their big concentrations have disappeared. The Bovanenkovo Gas Field was one of such places where they used to concentrate (Uspenskii and Kishinskii 1972). The reason for the decrease in number of birds in molting concentrations is probably disturbance by noise of machinery, especially helicopters. Geese are intensively hunted in areas near the settlements. The Red-breasted Goose is endemic to the Siberian Arctic. Its population in West Siberia is small in number but more or less stable; during the last 20 years it has fluctuated around several hundred pair (Ryabitzev 1993). The birds tend to migrate from Yamal to the more quiet Gydansky (Zhukov 1998). Eroded riverbanks are favorite nesting habitats of these birds. Interestingly, they nest under the patronage of the Peregrine Falcon (Ryabitzev and others 1989). In the 1970s, there were several dozen pairs of Red-breasted Geese and 12 to 15 pairs of Peregrine Falcons breeding in the mouth of the Yuribei River, but by the 1990s the number of geese had decreased three times, probably because of the exploratory drilling in the neighborhood (Ryabitzev and others 1989). One more negative example can be given from the Bovanenkovo Gas Field, where three pairs of Peregrine Falcons were breeding initially, but only one pair was left by the beginning of the 1990s.

Nevertheless, the West Siberian Arctic still contains an essential variety and number of ducks, waders, grouse, and small passerines (Ryabitzev 1993). Two species of predators are common over all the area, the rough-legged buzzard and the snowy

owl. Though several bird species are recognized as endangered and are protected, additional measures are necessary for their conservation. First of all there is need for the protection of breeding grounds. There are several areas with increased concentrations of rare birds (fig. 1), including: coastal habitats to the south of Kharasavei; in archipelago Sharapovy koshki; mouths of the Yuribei and Erkutayakha Rivers; the middle reaches of the Yuribei River; basins of the rivers Shchuch'ya; and Khadata, with outposts of forests on flood plains in southern Yamal. An increase in industrial activity and linear constructions connected with gas and oil transportation will become a serious hazard for the ornithofauna of Yamal.

Many areas in Yamal urgently need status as protected areas, but unfortunately nature reserves are absent in the area. A recently organized Gydansky Zapovednik (nature reserve), located in the north of the Gydansky Peninsula (fig. 3), was ratified at a much smaller size than was suggested by scientists (Kalyakin and others 2000), and is not really representative for the area. It is likely that only lands that are not of interest for the gas and oil industry, or for the reindeer herders, will receive protected status. Numerous suggestions regarding giving protected status to certain localities in Yamal remain only on paper.

Conclusions

The situation in the West Siberian Arctic needs permanent attention. Unfortunately, a system of ecological control of human activities (both industrial and recreational), as well as monitoring the state of wildlife populations is not working. Though technogenous impact is concentrated locally, destruction of important habitats affects populations of wildlife over the whole area. Distribution of rare wildlife and plant species should be taken into account when new constructions are planned. Modern maps of their distribution need to be published. The situation with reindeer husbandry also needs some urgent solutions, made in close contact with the Nenets people. The number of reindeer should be decreased.

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Evaluating Nature and Wilderness in Iceland

Thóra Ellen Thórhallsdóttir

Abstract—Iceland is sparsely populated with towns and farms mostly restricted to coastal lowlands. The country's ca 50,000 km² (19,000 mi²) interior is an uninhabited highland with isolated mountains and large glaciers. At present, only a small part of Iceland's rich geothermal and hydroelectric resources have been harnessed, but if political commitments to large-scale hydroelectric projects are realized, they will transform the central highland wilderness. Over the last 3 years, opposition to these plans has fueled the most bitter environmental conflict yet to arise in Iceland. To reduce such conflicts and for a balanced, long-term approach, work toward a *Master Plan for Hydroelectric and Geothermal Development* was initiated in 1999. Four workgroups will evaluate up to 100 potential projects for (1) environmental impacts, (2) impact on land use, (3) regional and social consequences, and (4) technical and economic aspects.

Ranking the projects by their impacts on the natural environment presented numerous difficulties, some of which will be discussed. The approach adopted and introduced here involved: (1) defining those natural "objects" that may have value, (2) defining criteria by which to measure these values, (3) defining criteria to evaluate consequential loss, and (4) ranking the projects from most to least acceptable. Within each of five broad classes—(1) geology and hydrology, (2) organisms, (3) habitats, (4) landscape and wilderness, and (5) cultural heritage—two to four objects were identified and their comparative value assessed. The projects were graded for degree of negative impact on: (a) whether they would violate Icelandic law or international conventions and (b) the extent of loss, disturbance, or impoverishment.

Characteristics of the Central Highland

Iceland is a 100,000 km² (38,610 mi²) island in the north Atlantic with a population of 280,000. Towns and villages are concentrated along the coast, and almost all farms are at altitudes below 200 m (657 feet) above sea level. Less than one-quarter of the country is inhabited, but almost half its total area is an uninhabited, desertlike central highland (fig. 1). The central highland rises sharply inland from coastal areas to form a gently rolling plateau with isolated mountains, which are either extinct or active volcanoes, and several large ice caps. Much of the plateau is covered by glacial deposits or lava fields with a plant cover of less than 5 percent. Continuous vegetation often forms sharply defined "oases" of varying sizes. Altogether, continuous vegetation probably only accounts for about 10 percent of the plateau's area. It is regarded as the fragmented relic of a previously much more extensive vegetation. The present desertlike appearance of the highland plateau is probably not its "natural" state, and it is likely that large areas carried continuous vegetation at the time Iceland was settled 1,100 years ago (see further discussion in Thórhallsdóttir 1997).

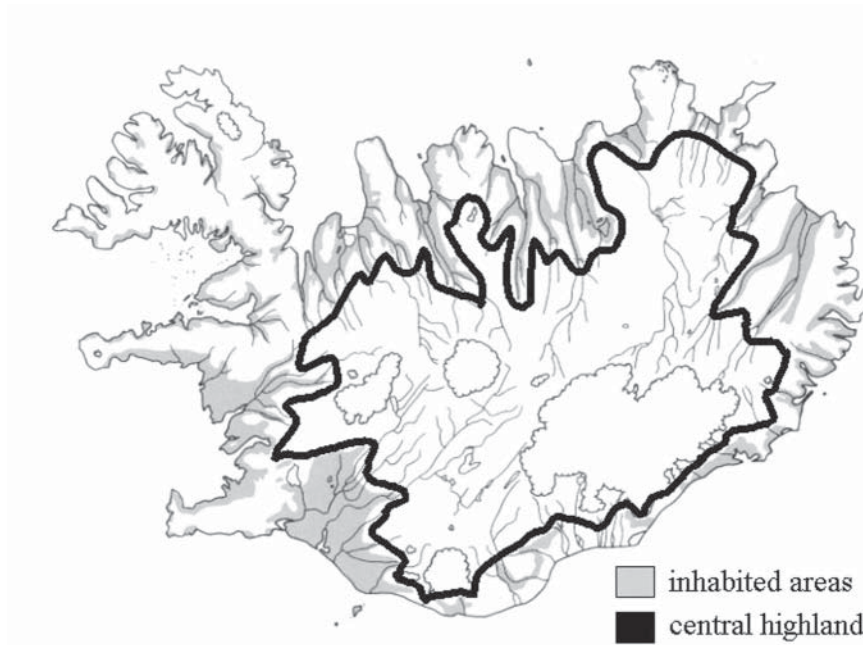
The vascular flora has few rare elements, but Iceland does have a number of vegetation types that are unusual in their composition or extent, for example, vast moss-covered lava fields. Further, the highland harbors a number of vegetation types that are rare in Europe, for example, *palsa mires*, productive riverine fens, and spring-fed oases with angelica and willows. The mammalian fauna is poor; the arctic fox is the only indigenous land mammal in Iceland. Reindeer, imported from Norway in the late 18th century, now roam the northeastern part of the country. Iceland is rich in bird life, and the central highland has a number of internationally important wetlands for birds, in particular the pink-footed goose (*Anser brachyrhynchus*).

Geologically, the central highland is extremely diverse, displaying a wide array of volcanic landforms. Few places offer a comparable opportunity to view such striking

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Figure 1—Inhabited areas of Iceland (light gray) and the approximate boundaries of the central highland (black line).



examples of the action of all major geomorphological agents—volcanoes, glaciers, water, and wind.

Central Highland as Wilderness

Historical and archaeological evidence shows that farming was attempted in parts of the highland first after the settlement of Iceland (9th to 11th century A.D.), but proved unsustainable and was soon abandoned (Thórarinnsson 1974). Most of the highland has never been inhabited or farmed, although it has traditionally been used for summer grazing for sheep. The Icelandic wilderness differs from its closest latitudinal counterparts in Scandinavia, America, and Greenland, in that it does not, nor has it ever had, an indigenous population.

The three words used to describe the central highland each reflects the Icelanders' sentiments towards the inland. The two traditional words are "*óbyggdir*," meaning "uninhabited land," and "*öræfi*," meaning "wasteland." The third word is used in the recent Icelandic wilderness protection legislation; "*viderni*," meaning "a land of distant views."

The central highland rises behind Icelanders in a literal and in an abstract sense. Farms often form a single line on the lowlands, facing either the sea or a valley bottom. Behind the farm, steeply rising mountains, scree slopes, and cliffs divide the inhabited from the uninhabited, and the known and predictable from the mysterious and untamable. The highland was a place where man was tested to his limits and often lost. Countless stories, poems, and legends tell of hazardous journeys through the highlands and of the ghosts of those who perished on the way, haunting travelers in mountain huts or visiting people in their sleep to complain about their fate. Other poems praise the landscape, the vistas, and the freedom; fertile valleys were supposed to nestle up against the glaciers, inhabited by terse people sometimes willing to help a traveler in distress. Farmers had to venture into the highlands once a year to collect the sheep in September, and this was one of the highlights of their whole year.

Undeniably, the central highland plays a significant role in the national identity of Icelanders. A recent comparative survey in three Scandinavian countries (Iceland, Denmark, and Sweden) demonstrates this; when asked what participants felt was the single most important common national heritage, landscape came first in

Iceland (not in the other two countries) ahead of language and history (Árnason, in preparation).

Wilderness and Landscape Values of the Central Highland

As a wilderness experience, Iceland is quite distinct from Scandinavia or Alaska. It cannot offer encounters with large animals, or the opportunity to observe them in the wild or in large numbers. Its scale (40,000 to 50,000 km²) (15,444 to 19,305 miles²) is of course less daunting than truly great wildernesses of the world. The Icelandic highland can be traversed centrally through its shorter axis in 1 day with about 300 km (186 miles) between the last farm in the south and the first in the north.

While it may not have any landscape types that are truly unique, the central highland of Iceland offers a more diverse visual experience than is available in most other countries. It is a rich mosaic of colors, landforms, and textures on a scale that can be sampled in a car journey of 3 to 5 days. It may be unrivaled as a virtual textbook on the processes shaping the surface of the earth through the action of glaciers, volcanoes, wind, and water. The resulting landforms are presented with great clarity because of their recent age and lack of vegetation. It is a land that simultaneously looks ancient and is obviously still being created.

The second distinctive feature of the central highland is its openness. It is a totally treeless landscape, often with a monotonous foreground but spectacular distant views of glaciers and blue mountains framing the horizon. The long expanses of rolling, dark gray, basaltic moraines are broken by oases of vegetation in the depressions, often dominated by willows, angelica, geranium, and other herbs, usually with springs and running water. The greens of the vegetation and the deep blue of the spring water contrast sharply with the surrounding desert.

Although much of the highland is covered by basaltic moraines, there are areas offering a different scenario. Several rhyolitic areas, usually displaying geothermal activity, are characterized by multicolored, striated mountains in bright tones of yellow, pink, green, and blue. North of Vatnajökull, in parts of the 3,400 km² (1,313 miles²) Ódádahraun lava field, fields of tortuous black lava are half submerged in shining yellow pumice.

The Icelandic central highland is mostly harsh, often hostile, and in some places decidedly alien compared to most other parts of the world. It is clearly a place where man does not belong. In all the 1,100 years of human history in Iceland, only two people (a couple in the mid-18th century) are known to have been able to carve out a living there. Except for tracks and occasional mountain huts, much of the central highland remains free of visible modern technology. According to the World Wide Fund for Nature, it is the largest remaining terrestrial wilderness in Western Europe (including Scandinavia, but excluding Svalbard).

Definition and Legal Status of Wilderness in Iceland

Wilderness was defined in the Nature Conservation Act (44/1999, 140/2001) as an area

...at least 25 km² (10 mi²) or such that solitude and nature may be enjoyed without disturbance from man-made structures or motorized traffic, lies at a distance of at least 5 km (3 mi) from man-made structures including power lines, power stations, reservoirs and roads, and where a direct influence of man is absent and nature may develop without stress imposed by human activity.

Wilderness has no status of protection, and the only subsequent reference to it in the Nature Conservation Act stipulates that wilderness shall be included in a comprehensive Nature Conservation Plan, now being prepared for the first time.

Energy Development

Iceland has considerable energy resources in waterpower and geothermal heat. Estimated utilizable hydropower is 37,000 GWh/year, of which about 18 percent has been harnessed (Björnsson 2001). Accurate assessment of utilizable geothermal

energy is difficult but is at present estimated at about 20,000 GWh/year, of which about 6 percent is now used (Björnsson 2001). Geothermal sources close to inhabited areas have now largely been harnessed, but at present there are no geothermal power plants in the highland. Plans for hydropower development usually involve a reservoir on the central highland plateau, capturing the fall down to the lowlands. The reservoirs would mostly lie in shallow, but often vegetated, depressions, with a large surface area-to-volume ratio and a wide drawdown zone.

The present government of Iceland is committed to the development of energy-demanding industries, and several projects are being prepared. Most include large reservoirs on the highland plateau with attendant dams, tunnels, spoils, canals, and power lines. At present, two such projects are being planned, one of which would affect 3,000 km² (1,158 miles²), conservatively estimated. If realized, they would have an enormous impact on the central highland, including loss and further fragmentation of vegetation, loss of important breeding grounds for birds, reduction of biodiversity, and the landscape transformation of very large wilderness areas. The impact of such developments on the recreational and wilderness value of the highland can be assessed from a survey carried out in four highland areas in the summer of 2000. A great majority (90 percent of the 1,147 foreigners and 86 percent of the 677 Icelanders surveyed) cited nature as a highly important reason for their visit, and 79 to 82 percent considered landscape view important. Concurrently, 88 to 94 percent considered energy-related structures (power lines, power stations, and reservoirs) as undesirable in the highland, and 75 to 88 percent believed these structures would negatively impact their experience. Almost three-fourths of the foreign visitors said such developments would reduce their desire to visit (Gudmundsson 2001).

Framework Plan for the Use of Hydropower and Geothermal Energy

In 1998, a plan for hydroelectric development in the rich fenlands of Eyjabakkar, in the northeast highland, caused the most bitter environmental debate Iceland has yet seen, and literally divided the country into two opposing camps. The plan was finally abandoned in 1999, but it served as a painful illustration of the shortcomings in the planning of energy projects in Iceland, where only one project has been prepared at a time; only at the last stages, after costly engineering and geological work, have environmental impacts been considered. In an attempt to avoid similar deadlocks in the future, a *Framework Plan for Hydroelectric and Geothermal Development* was initiated in 1999. Its objectives are to evaluate potential sites or projects for energy development in Iceland and to classify or rank them according to general suitability.

The Plan's Board is composed of 17 people, including the chairmen of four workgroups. The Board's current chairman is Sveinbjörn Björnsson, physicist and former Chancellor of the University of Iceland. The framework plan will eventually evaluate about 100 potential sites or projects, about two-thirds are hydroelectric and about one-third geothermal. The four workgroups were established in 1999 and each will evaluate potential projects for: (1) environmental and cultural heritage, (2) impacts on land use (tourism, grazing, fishing, and hunting), and (3) national, regional, and social consequences. Workgroup 4 selects and defines the projects and describes their technical and economic aspects.

For several reasons, sites with energy potential are likely to be among the more valuable highland areas. Hydroelectric development requires water and elevational variation; these two together are also often associated with spectacular landscapes—large rivers, waterfalls, and canyons. Accompanying reservoirs fill depressions in the land—the oases of continuous vegetation. They are the sole habitat of the majority of higher organisms in the highland; old organic soils are limited to these areas that have much higher biodiversity and productivity than the surrounding desert. Additionally, the oases are important visual focal areas in the landscape and harbor most of the archeological remains. The geothermal areas are highly unusual and distinctive in most respects. They are rare and scientifically important geological

and hydrological phenomena. Biologically, they represent tiny islands that harbor a number of rare (in Iceland) vascular plants and unique assemblages of microbes adapted to high temperatures, which are scientifically important and have potential biotechnological application.

Next, the approach and methodology of Workgroup I on environment and cultural heritage will be described. The group is composed of 13 representatives from government institutes, the University of Iceland, and environmental nongovernment organizations (NGOs).

Evaluating Nature and Wilderness in Iceland: Approach

The task faced by Workgroup I was daunting in its scale and complexity. One approach could have been a “wise-man panel,” where experts from different fields conferred to reach a consensus. This option, although appealing, was hardly open to the group. In the small Icelandic society, it would have left the outcome open to criticism of personal bias, and it would have meant that the evaluation process was essentially nontransparent. Environmental aspects of energy utilization are a highly sensitive matter in Iceland. To ensure wide acceptability of the work, it was paramount that the method could be seen to be transparent and as objective and logical as possible.

The flexibility the group had in defining its approach was somewhat limited by the way the framework plan was structured. The Board will eventually weigh together the outcome of the four workgroups from a ranking from each one. This excluded the alternative of evaluating different combinations of projects (for example, totaling up to a specified energy potential) for their total impact, which at least in some respects, might have been a preferable approach.

The group opted for an integrative approach, where natural and cultural phenomena were divided into several classes, each of which was scored on a set of values. Both object classes and attributes were weighted according to importance. The approach can be summarized as follows:

1. Defining natural and cultural “objects” that may have value.
2. Defining attributes by which to measure these values.
3. Defining criteria to evaluate consequential loss.
4. Scoring and subsequent ranking of areas for their natural and cultural resources.
5. Scoring and ranking of projects for impact.
6. Ranking of projects from most to least acceptable, considering both resource value and impact.

Database

One shortcoming the group faced was a lack of a comprehensive nature and cultural database for the central highland. Good distribution maps are available for all vascular plants (Kristinsson 1986, unpublished data), plus red data lists with World Conservation Union (IUCN) classifications and distribution maps are available for plants and birds (Icelandic Institute of Natural History 1996, 2000). The insect fauna is incompletely mapped, especially in the highland. It has recently been realized that palsa tops may be important habitats for several rare or very rare (in Europe or globally) lichen species, but at present, knowledge of the lichen flora is patchy. As yet, there is no coordinated database of Iceland’s remarkable geodiversity.

Objects

Five main groups, or object classes, of environmental resources were recognized: (1) geological/hydrological; (2) organisms; (3) biotic communities and soils (here called habitat types); and (4) landscape and wilderness, as well as (5) cultural and historical resources. Within each of these, one or more subclasses were identified (table 1).

Table 1—Object classes and subclasses for evaluating natural and cultural resources.

Object class	Subclasses	Examples, notes
Geological and hydrological	Bedrock	Volcanoes, fissures, lava
	Unconsolidated sediments	Moraines, eskers
	Groundwater	Includes springs and geothermal fields
	Lakes	Classified by chemistry/biology
	Rivers and streams	By origin (for example, glacial, spring fed)
Organisms	Species	Vascular plants, birds, fish, mammals
Habitats	Habitat types and soils	Only organic soils included
Landscape and wilderness	Landscape	Landscape type, visual value
	Special features (visual)	Waterfall, rock formation
	Wilderness	Based on Nature Conservancy map
Cultural and historical	Inhabitation, communication, historical, folklore	Farm ruins, goose and sheep pens, cairns, trails, outlaws, legends

Table 2—A weighted objects x attributes matrix, scored for value or impact.

Object classes	Subclasses	Richness, diversity	Rareness	Size, continuity, completeness	International responsibility	Epistemological and symbolic value	Visual value
Geological and hydrological	Bedrock	0.3	0.2	0.3		0.2	
	Unconsolidated sediments	.3	.2	.3		.2	
	Ground water	.3	.2	.3		.2	
	Lakes	.3	.2	.3		.2	
	Rivers and streams	.3	.2	.3		.2	
Organisms	Species	.4	.4		0.2		
Habitats	Habitat types and soils	.3	.3	.2	.1	.1	
Landscape and wilderness	Landscape	.3	.2	.2			0.3
	Wilderness		.2	.8			
Cultural heritage	Inhabitation, communication historical, folklore	.2	.3	.2		.3	

Attributes

Six attributes for evaluation were defined and applied to all object classes (table 2):

1. It is generally true that what is “diverse” or “rich” is more valuable than that which is depauperate.
2. “Rareness” is another general attribute; objects with few elements are in greater danger of disappearing altogether, with attendant reduction in diversity and loss of knowledge.
3. The third attribute that increases the worth of an area or object is the state of “being large (size),” “continuous,” or “complete.” This is particularly important biologically (large populations and large intact areas are more valuable than small populations and small, fragmented areas), but also holds for other object classes.
4. “International responsibility” refers to objects where Iceland has acknowledged European or global importance, and it is emphasized here because of the unequivocal status it imparts. Here, it applies particularly to birds because Iceland serves as a major breeding ground or summer destination for many species, several of which are rare in Europe and listed under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern 1979). Three Icelandic sites are acknowledged under the 1971 Ramsar (Iran) Convention of Wetlands, one in the highland and another bordering it.

International cooperation on conservation theory and actions is well established in several fields in biology (for example, biodiversity). In contrast, little such progress

seems to have been made in geology. This is particularly unfortunate for evaluation of geodiversity in Iceland—a country rivaled by few in the diversity of particularly volcanic but also glacial and geothermal phenomena.

5. “Epistemological value” is the next attribute. A natural object may have a particular scientific value, or it may have typological value, for example, a volcanic feature considered especially representative of its particular type. Some objects may also have symbolic value, for example, the hot spring “Geysir,” which has given its name to such phenomena internationally.
6. The final attribute is “visual value,” which is only assessed for landscape.

Value and Impact Assessment

Sites are scored for each attribute \times object on a nonlinear scale: 1 = low, 3 = some value, 6 = high value, and 10 = very high value. The column sums are calculated as a measure of total value:

$$(V = \sum_{i=1}^6 a_i * w_i \text{ where } a = \text{attribute and } w = \text{weight}).$$

V (and when necessary, the matrix) serves as a checklist for the next step: ranking the sites by their natural and cultural resources. This is done five times, once for each main object class, by Analytical Hierarchical Process (AHP, Saaty 1990). AHP involves a cross-comparison of all entries (here sites), determining whether the two represent equally good choices or whether one is little, somewhat, significantly, or much better than the other. Ranking consistency can be tested afterwards.

To avoid possible ambiguities in attaching negative or positive labels to the changes brought on by energy development, the evaluation of impacts is based on the goals of conservation as defined in Article I of the Nature Conservation Act (44/1999, 140/2001), and the Archaeological Act (107/2001). Accordingly, impact is judged as to how it would affect “...the evolution of Icelandic nature according to its own means” (Nature Conservation Act 44/1999), and “...the conservation of cultural/historical remains in their own environment” (Archaeological Act 107/2001).

The ranking of projects for impacts is done in a manner analogous to the ranking of sites for value. The object \times attributes matrices are filled with scores, and the column sum is calculated (table 2). The final sum plus the matrices serve as checklists for the AHP ranking of projects from worst to best.

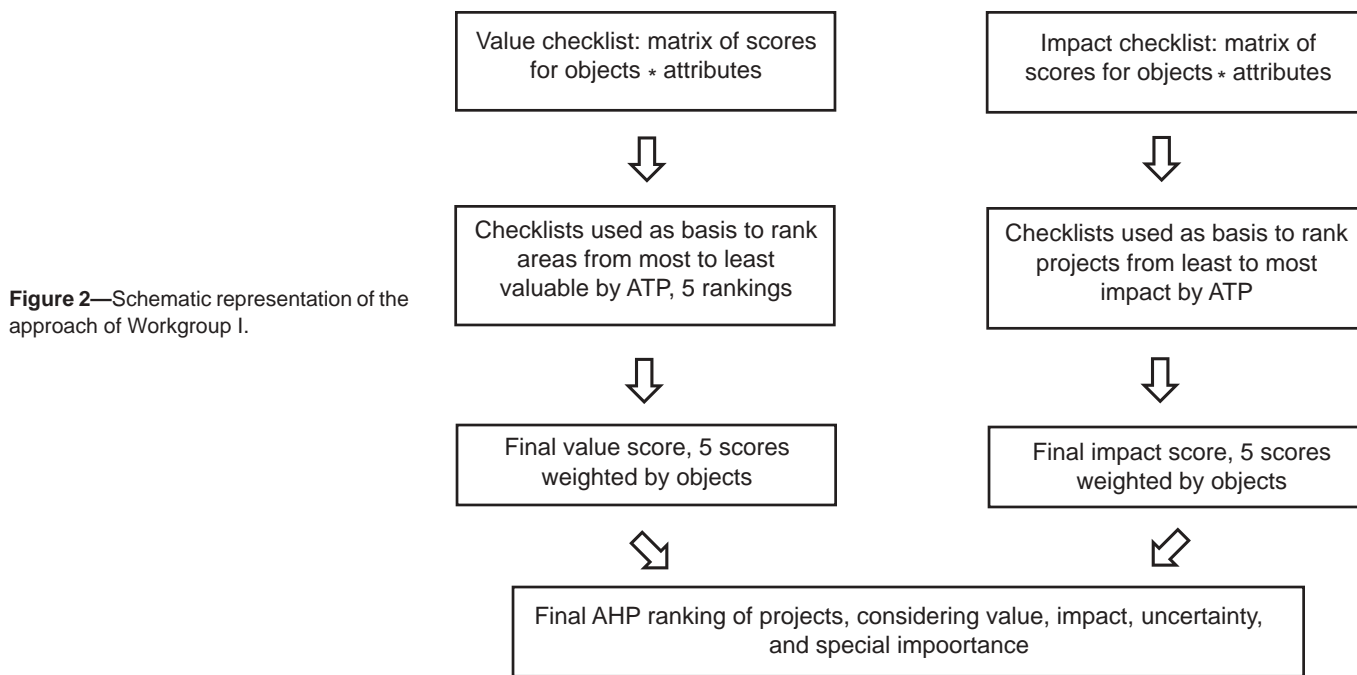
The composite value of each site is then calculated from its final score for each of the five objects, corrected for object weight.

Final Ranking of Projects

Prior to the final ranking, two sums have been prepared for each project: one reflecting the total environmental and cultural value of the site, and the other reflecting the total impact of the development (fig. 2). On the checklist for the final ranking, two other considerations are included.

One is a qualitative measure of the uncertainty or risk associated with the project. Some hydroelectric projects involve diversions of major rivers, which may have enormous consequences downstream. This includes effects on ground water and hence on low-lying vegetation such as wetlands, onshore erosion, and on offshore productivity. In addition, a wide drawdown zone cutting across vegetation in shallow depressions poses particular threats of wind erosion in the highly friable and easily eroded volcanic soils of Iceland.

The second consideration allows Workgroup I to take into account any special importance that a site may have. The composite value sum should reflect the total value of a site, but the weighted scores mean that a single phenomena, no matter how important, can only exert so much influence. On the checklist for the final ranking, the special importance that a site may have is listed and taken into account at the final ranking. Special importance includes, for example, nature reserves and national parks that would be affected, endangered species, and places or phenomena of acknowledged symbolic or scenic value, such as major waterfalls.



It may be asked why the Workgroup chose to include both value and impact for its final ranking, rather than just impact. There are two reasons for this. First, they work from the general premise that a highly valuable site should be ranked lower as a choice for power development than a site of low value. Second, for most sites, a fair to good natural resources database is available (see previous discussion), but an environmental impact assessment has not been carried out for the great majority of projects. There is, therefore, much greater uncertainty associated with the group's estimates of impact than with the estimates of value. There is, for example, no information on access roads and power lines.

Evaluation of Projects by the Framework Plan

In April 2002, the four workgroups completed a preliminary ranking of 15 projects, intended primarily as a test of approaches. The methods will now be reconsidered and a reranking of the same projects completed in September.

The final presentation of the potential energy projects will probably be in the form of a two-dimensional graph. A measure of the economic gains of the projects (standardized energy potential, GWH/year, or profits, possibly weighted by national/regional economic consequences) will be plotted against environmental considerations. The environmental axis will be the weighted rank sums of Workgroups I and II, such that nature + cultural heritage will have a double weight (66 percent) against recreation + fishing + hunting (33 percent).

Future Developments

The small domestic market in Iceland grows slowly, and large projects are only economical if there is a large buyer of energy. As mentioned earlier, the present government of Iceland is committed to the development of energy-demanding industries and is trying to attract investors for aluminum and other smelters. At least two smelters already operating wish to greatly increase their size.

If these plans are realized, the accompanying hydroelectric projects would fragment the largest remaining terrestrial wilderness in Western Europe, and directly and indirectly constitute a severe degradation of the geological and biological diversity of the central highland. The issue of whether such a course is justifiable

(economically, morally, biologically) in view of the long-term costs will not be resolved by the Framework Plan. Exactly what status the plan will eventually have is not even clear, but hopefully its contribution will lead to a more comprehensive and balanced evaluation of the natural resources of Iceland.

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Alaska Exceptionality Hypothesis: Is Alaska Wilderness Really Different?

Gregory Brown

Abstract—The common idiom of Alaska as “The Last Frontier” suggests that the relative remoteness and unsettled character of Alaska create a unique Alaskan identity, one that is both a “frontier” and the “last” of its kind. The frontier idiom portrays the place and people of Alaska as exceptional or different from the places and people who reside in the Lower Forty-Eight States, especially in regard to human perception and interaction with the surrounding landscape. The notion that Alaska represents the “last frontier” leads to what may be called the “Alaska exceptionality” hypothesis, the idea that the concept of wilderness in Alaska, one that was constructed in a “frontier” setting, is different from the “received” idea of wilderness in the Lower 48 States. Three dimensions of the Alaska exceptionality hypothesis with respect to wilderness are explored here—geographical context, set of social conditions, and subjective response to place—with indepth analysis of subjective response to place. Using survey data collected as part of the Chugach National Forest planning process, this paper describes Alaska residents’ subjective response to the concept of wilderness (attitudes, values, and beliefs) and compares this response with results from the National Survey on Recreation and the Environment (NSRE). It is argued that the subjective response of Alaskans to the concept of wilderness is similar to residents in the Lower 48 States on some wilderness values, but some differences in wilderness values are present that provide support for the Alaska wilderness exceptionality hypothesis. It is further argued that the geographical separation of Alaska from the Lower 48 States contributes to the difference in subjective response to the concept of wilderness, one that may not be present in countries that are largely or exclusively circumpolar.

Introduction

In his book “Community and Identity on the Alaska Frontier,” Cuba (1987) describes how the forces of migration and mobility have served to reinforce and strengthen Alaska place identity among its residents. Symbolic images of a wild Alaska frame the expectations of migrants to Alaska, with some migrants identifying themselves as different from other people (for example, more adventurous or more independent) even prior to moving to Alaska. Once migrants arrive, they establish and perpetuate an identity based on comparative experiences with the world “outside” Alaska. The constructed Alaska image is one where the people are friendlier and more independent, economic opportunities are greater and more challenging, and its government more accessible and immediately felt. The distinctiveness of Alaskan life is reinforced through travel to the Continental United States where friends, family members, and even strangers expect them to display visible signs of their Alaskan experiences. Indeed, some Alaska residents begin to think of themselves as Alaskans only after they travel outside of the State. As Cuba (1987: 165) notes, “residents of Anchorage assume a frontier mien because it is expected of them.”

But the construction of an Alaskan identity is not purely symbolic. The meaning of place is derived through everyday, local interaction and cannot be separated from its location. Accordingly, “the content of the Alaskan place identity is anchored in the particulars of place” (Cuba 1987: 170). In other words, it is the subjective response of Alaska residents to the place of Alaska that constructs and reinforces the image of Alaska as exceptional or different. In his analysis of Frederick Jackson Turner’s frontier thesis, Cuba (1987: 14) writes that Turner actually references three distinct types of frontiers: (1) as a geographic territory with identifiable physical characteristics (for example, “the margin of settlement which has a density of two or more to the square mile”), (2) as a set of social conditions resulting from human interaction with the environment (for example, “a form of society”), and (3) a subjective response

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to place that includes attitudes, beliefs, and values (for example, “a state of mind”). Thus, the concept of “frontier” is an ambiguous one without reference to the definitional type of frontier. With respect to Alaska, Cuba believes that Alaskans, particularly residents of Anchorage, have adopted a frontier “state of mind” that is quite far removed from a daily routine that requires coping with primitive living conditions.

The adoption of a “frontier” state of mind stands in stark contrast to the realities of everyday life (social conditions) for the majority of Alaska residents. Historian Stephen Haycox (1999) notes that the majority of Alaskans live in what he terms a “replication corridor,” consisting of a narrow strip of human habitation that mirrors urban conditions found outside Alaska. Here, life in both the large and smaller urban centers is nearly indistinguishable from life in cities and towns across the Western United States. Residents can access all the amenities, conveniences, and comforts of urban life found elsewhere in America. Haycox believes Alaska’s replication corridor “manifests little that is different from the American west” despite its more remote location and the potential within it for an embrace of wilderness values. For Haycox, the culture where the majority of Alaska residents live does not support the Alaska exceptionality hypothesis, at least with respect to the set of “social conditions.”

The concept of “frontier” is predicated on contrasting images—civilization versus wilderness, urban versus rural life, and conformity versus individualism. Without the concept of “wilderness” there would be no “frontier.” The argument set forth here is that the concepts of wilderness and frontier are derivatives of each other and, therefore, share the same basic typology and conceptual ambiguity. Like the frontier, wilderness may alternatively be conceived of as a geographic territory (for example, an area within the National Wilderness Preservation System), as a set of social conditions (for example, a subsistence lifestyle), or as a state of mind (for example, a natural or pristine area).

The first two concepts of wilderness—as a geographic territory and as a set of social conditions—are briefly described below followed by the main thrust of this paper, wilderness as a state of mind or perception.

Wilderness as “Exceptional” Geographic Territory

Since passage of the Wilderness Act in 1964 (Public Law 88-577), substantial additions have been made to the National Wilderness Preservation System (NWPS) in Alaska. Most of the Alaska wilderness acreage was added in 1980 with passage of the Alaska National Interest Lands Conservation Act (Public Law 96-487), which added over 56 million acres (22,680,000 ha) to the NWPS. Alaska now has more than 58 million acres (23,490,000 ha) of wilderness in 48 units located in National Wildlife Refuges, National Parks, and National Forests spread from the extreme Southeast (Tongass National Forest) to the Arctic Coast (Arctic National Wildlife Refuge). Over 55 percent of the entire NWPS acreage is located in Alaska, and Alaska wilderness has more land area as a percent of total State land (15.4 percent) than any other State (Landres and Meyer 2000). The largest wilderness unit in Alaska is the Wrangell-St. Elias Wilderness at 9.7 million acres (3,928,500 ha), and the smallest unit is the Hazy Islands Wilderness at 32 acres (13 ha).

The geography of Alaska wilderness appears exceptional from an ecological perspective. Alaska is dominated by the “polar” ecosystem domain (Bailey 1980) with “tundra” and “subarctic” divisions comprising the largest area of land. The tundra climate is characterized by very short, cool summers and long, severe winters. Polar ecosystems contain vegetation dominated by grasses, sedges, lichens, and willow shrubs. Subarctic ecosystems are shaped by a climate with great seasonal range in temperature, severe winters, and small amounts of annual precipitation concentrated in the three warm summer months. Subarctic vegetation is dominated by a large belt of needleleaf forest referred to as boreal forest. These tundra and subarctic areas comprise approximately 14.5 percent of the total land area in the United States (Bailey 1980). The other ecosystem division present in Alaska is the “marine” division that shares some characteristics with coastal areas in the Pacific Northwest. The marine ecoregions occupy a relatively small land area in the United States (3.7 percent) along the Pacific coast. These ecosystems of Alaska support abundant

populations of faunal species not found elsewhere in such large concentrations, including brown and black bear, caribou, and moose.

Alaska contains relatively few public roads for its size, a total of 12,686 miles (20,412 km) of roads (Federal Highway Administration 1999). Only the smaller States of Hawaii, 4,257 miles (6,850 km), Delaware, 5,748 miles (9,249 km), and Rhode Island, 6,052 miles (9,738 km) have fewer road miles, but with significantly higher road densities.

Thus, from a size and ecology perspective, the geographical territory of wilderness in Alaska is “exceptional” from that found in the Lower 48 States.

Wilderness as Social Conditions

Are social conditions surrounding Alaska wilderness more “primitive” or “wild” than in the Lower 48? The population of Alaska, like many Western States, is urban with over half the statewide population of 627,000 (United States Census 2000) living in Anchorage or the nearby Matanuska-Susitna Valley. Alaskans who live in the “replication corridor” are not self-sufficient in the frontier sense, many holding jobs in the service or government sectors of the economy. These people live ordinary lives and are accustomed to all the conveniences and nuances of modern, nonwilderness living that are nearly indistinguishable from cities and towns in the Lower 48. The much touted “higher cost-of-living in Alaska,” a general characteristic of frontier geography, has largely faded, at least in the “replication corridor” through efficient transportation and distribution channels. As Haycox (1999) writes, “in the human culture of the replication corridor...there is little to distinguish the places as Alaskan.”

The “primitive” living conditions, generally associated with a frontier and wilderness existence, are absent in the “replication corridor,” although primitive conditions continue to exist in rural or “bush” Alaska where the traditional “honey bucket” persists. For example, 89 of the 192 Alaska Native villages do not have water piped or trucked to homes, and as many as 20,000 of the 86,000 Alaska Native villagers depend on the so-called “honey bucket” system of waste disposal (Rural Alaska Sanitation Coalition 1999). But for most Alaskans, water, waste, and health conditions are similar to those found elsewhere in the United States.

And yet, even in the area of social conditions, one could argue, perhaps unconvincingly, that small things in Alaska add up to “differences” in social conditions. Anchorage is the only large urban area in the United States where mega fauna such as moose and bears coexist, uneasily at times, with urban residents. Anchorage is the only major city with a 500,000-acre State Park (including State-designated “wilderness”) located within its municipal boundary. And Alaska has a relatively high population (98,000) of American Indian and Alaska Natives whose unique and traditional culture continues to color the lives of Alaskan residents.

Wilderness as a State of Mind

If wilderness is a social construct, as Cronin (1996) and others suggest, the Alaska wilderness exceptionality hypothesis would posit that Alaskans perceive and value wilderness differently than other United States residents in the Lower 48. How do Alaskans perceive their wilderness landscapes compared to those “outside”? Ideally, one would construct a study to measure wilderness perceptions and values, sampling both Alaska and “outside” residents utilizing commonly recognized wilderness themes and places. Unfortunately, this data is not available. An alternative approach—one that is attempted here—is to compare national level measures of wilderness values with Alaska-based measures of wilderness values.

Comparing Alaska Wilderness Values to National Wilderness Values

Two national surveys (National Survey on Recreation and the Environment) were conducted in 1995 and 2000 that provide national level statistics and regional summaries of wilderness values (Cordell and others 1998) based on a typology of 13

wilderness values. In Alaska, Brown and Reed (2000) collected landscape values data as part of the Chugach National Forest (CNF) planning process. This value typology also consisted of 13 values. A comparison of the two methodologies appears in table 1.

The 1998 Alaska study was conducted as part of the CNF planning process. A multipart survey was sent to Alaska residents living in communities surrounding the CNF and also included a Statewide random sample of Alaska residents. The questionnaire contained five sections: (1) questions about the familiarity of the recipients with CNF (number of times visited, level of subsistence use, employment relying on the CNF, and level of interest in the CNF's future); (2) measurement of attitudes toward 19 potential forest uses on a 5-point Likert scale ranging from "Strongly Favor" to "Strongly Oppose"; (3) a series of eight policy questions specific to the CNF plan revision such as how much logging, wilderness, "wild and scenic" river designation, and new roads should be included in the revised plan; (4) a set of 13 landscape values in which respondents were to rank personal value preferences and to spatially locate these values on the landscape; and (5) selected demographic information including age, gender, level of education, occupation, and race. The overall survey response rate was 31 percent, yielding over 800 usable responses.

The initial list of landscape values to be included in the questionnaire was based on the typology suggested by Rolston and Coufal (1991). In addition to their 10 values, two additional values—cultural and therapeutic value—as suggested by Rolston (1989) were added. In deference to the importance of subsistence as a legal, social, and political concern to Alaskans, subsistence value was also included in the typology. Each of the 13 values was accompanied by a short phrase to communicate the intended meaning of the value.

Although the wilderness value methodologies appear too different for direct comparison, with great trepidation, the results from the National Survey on Recreation and the Environment (NSRE) and Alaska surveys appear in table 2. Because the rating scales differed between surveys, the most reliable comparison is the relative ranking of value importance in the two surveys. One obvious difference is the high value Alaskans assign to recreation compared to respondents in the Lower 48. Alaskans rank recreation as the highest value compared to rankings of 10th and 12th for the 1995 and 2000 NSRE studies, respectively. This result may be partially explained by the fact that the Alaska survey asked about the entire CNF, including

Table 1—Comparison of wilderness values methodologies.

	Wilderness values scale (Haas and others 1986)^a	Ecosystem values scale (Brown and Reed 2000)
Number of values	13	13
Application	Specific to wilderness	General landscapes (terrestrial and marine)
Scale of measure	Rating: 5-point Likert from "extremely important" = 1 to "not important" = 5	Ranking/rating: Allocation of 100 points among 13 values
Type of survey	Phone	Mail
Place specific	No	Yes
Attributes of measure	Rating of values (interval). Easy to administer and simpler to complete. Conducive to parametric statistics.	Ranking of values (ordinal). Values are manifestations of choice. Measures force distinction between values.
Weakness of measure	Results in lack of differentiation among values and "end piling." Respondents not forced to make choices required by ranking. Lack of differentiation can weaken correlations among variables, and important relationships between value ratings and other variables may be overlooked (Greenleaf and others 1999).	May force distinctions between values where none exist. Ranking task is more difficult to administer. Difficulty increases when number of items to be ranked are more than four or five. Difficult to administer by telephone. Analysis limited to use of nonparametric statistics. ^b

^a The National Survey of Recreation and the Environment was conducted in 1995 and 2000.

^b The measurement scale asked respondents to allocate 100 points among 13 values. An advantage of this method is that the resulting data may be treated as either interval or ordinal level measures and analyzed accordingly.

Table 2—Comparison of important national wilderness values (1995, 2000) and Alaska ecosystem values (1999).

Wilderness values scale (Haas and others 1986)	Ecosystem values scale (Brown and Reed 2000)	1995 NSRE ^a very or extremely important	2000 NSRE ^b very or extremely important	1998 CNF ^c very or extremely important
Recreation	Recreation	48.9 (10) ^d	56.7 (12)	40.9 (1)
Spiritual	Spiritual	43.2 (12)	58.2 (10)	8.0 (10)
Scientific	Learning	46.3 (11)	57.4 (11)	5.2 (11)
Scenic beauty	Aesthetic	59.7 (7)	74.3 (7)	34.1 (3)
Future generations	Future	76.9 (4)	85.1 (4)	21.7 (5)
Knowing it exists	Intrinsic	56.1 (9)	74.1 (8)	8.4 (9)
Tourist income	Economic	22.8 (13)	33.3 (13)	21.0 (6)
Air quality	Life sustaining	78.0 (3)	91.7 (1)	37.0 (2)
Water quality		78.9 (1)	91.4 (2)	
Endangered species	Biological diversity	73.7 (5)	82.9 (5)	29.7 (4)
Wildlife habitat	—	78.6 (2)	87.2 (3)	
Preserving ecosystems	—	66.5 (6)	79.7 (6)	
Future use option	—	59.4 (8)	73.2 (9)	
—	Therapeutic			9.0 (8)
—	Cultural			3.2 (13)
—	Subsistence			19.9 (7)
—	Historic			3.3 (12)

^a Source: Cordell and others 1998. Value scores ranged from: extremely important = 1, to not important = 5.

^b Source: U.S. Department of Agriculture and the National Oceanic and Atmospheric Administration, National Survey on Recreation and the Environment 2000 Summary Report No. 2. Value scores ranged from: extremely important = 1, to not important = 5.

^c Raw value scores ranging from 0 to 100 were recoded into five categories where: 1 = extremely important (raw score = 21+); 2 = very important (raw score = 11 to 20); 3 = important (raw score = 6 to 10); 4 = slightly important (raw score = 1 to 5); and 5 = not important (raw score = 0).

^d The numbers in parentheses rank value importance from 1 to 13 based on the percent of respondents who rated that value as either very or extremely important.

roaded areas, not just potential wilderness areas in the forest. Nonetheless, most of the CNF is roadless and has landscape characteristics that would legally qualify as Wilderness under the 1964 Wilderness Act.

An important area of agreement between Alaska respondents and national respondents is the importance of wilderness to sustain life—as a source of clean air and water, and as a repository of biological diversity. These values ranked high in both studies.

Four values appear in the Alaska study typology that do not appear in the national study of wilderness values. Two of the values—cultural and historic—ranked the lowest in the Alaska study and probably do not significantly detract from the comparability of the Alaska and national studies. But two other values—therapeutic and subsistence value—do rank high enough (seventh and eighth) in the Alaska study to undermine direct value comparisons of the studies. Subsistence value, in particular, must be accounted for in Alaska research of wilderness values to be meaningful, and yet this value is probably not significant to wilderness in the Lower 48.

If a difference in perception in wilderness values exists among Alaskans, it would be that Alaskans hold a more instrumental view of wilderness. Wilderness is a place to use, recreate, and explore, not a place to be left alone. Alaskans also recognize the economic value of wilderness from a tourism perspective and fully expect that the landscape will be exploited for its tourism potential (economic value in Alaska ranked 6th compared to 13th in the NSRE studies). Alaskans also acknowledge the extraordinary scenic beauty of the landscape and place a high value on aesthetics (aesthetics ranked third in the Alaska study and seventh in the national results).

An attempt was made in both the Alaska and national studies to determine whether the value typologies contained latent variables, and if so, how much variation these variables could explain. When exploratory factor analysis was conducted on the Alaska and national value survey responses using comparable methods (principal components, varimax rotation, and eigenvalues greater than 1 as the factor breakpoint), different results appear (table 3). The Alaska values typology is more resistant to data reduction, producing four factors compared to two factors, while explaining about the same level of overall variation. Arguably, factor analysis produces little additional insight for either value typology. The values typology utilized in the national study yields variables that are too general (protection and utilization), and the Alaska values typology yields latent variables that are difficult to ascribe meaning. Neither

Table 3—Factor analysis of wilderness values^a.

NSRE (1995) ^b	Chugach NF Planning Study (1998)
Factor 1 (wildland protection 47.4%)	Factor 1 (wildland utilization 17%)
Wildlife habitat	Spiritual
Endangered species	Therapeutic
Protect ecosystems	Economic
Future generations	Factor 2 (wildland knowledge 11%)
Air quality	Learning
Water quality	Historic
Future use option	Cultural
Knowing it exists	Factor 3 (wildland legacy 10%)
Factor 2 (wildland utilization 9.7%)	Biological diversity
Tourist income	Future
Recreation opportunities	Subsistence
Spiritual inspiration	Factor 4 (wildland aesthetic 9%)
No loading	Aesthetic
Scenic beauty	Recreation
Scientific study	No loading
	Life sustaining
	Intrinsic

^a Principal components extraction, varimax rotation, eigenvalues >1, and factor loadings > 0.5.

^b The National Survey of Recreation and Environment was conducted in 1995.

factor analysis does well in capturing a high percentage of the overall variation in the model. Factor analysis does indicate that a “wildland utilization” factor appears to be present in both typologies, while the “wildland protection” factor in the national study appears similar to the “wildland legacy” factor in the Alaska study.

Characteristics of Alaska Wilderness Supporters and Opponents

Perhaps more meaningful to understanding wilderness values in Alaska is an assessment of those who support and those who oppose formal wilderness designation of public lands in Alaska. In the 1998 CNF planning study, a specific survey question was asked to determine support or opposition to additional designation of Wilderness (capital “W” wilderness) in the CNF. Respondents were also given the option of supporting the amount of wilderness recommended in the 1984 forest plan (status quo option). Alaska residents were divided on the issue of whether to recommend designation of more wilderness for the CNF, with about one-third favoring more wilderness, about one-third favoring less wilderness, and about one-third opting for the status quo 1.7-million-acre (688,500-ha) 1984 CNF plan recommendation.

Demographics

Table 4 presents a summary of the demographic characteristics of supporters and opponents of additional wilderness designation in Alaska—individuals who responded that they would prefer more or less wilderness designation. Individuals who preferred the same amount of designated wilderness in the CNF are not included in table 4. The results indicate that wilderness supporters in Alaska tend to be younger, are more disproportionately female with a higher level of formal education, have lived in Alaska a relatively shorter period of time, and more likely live in an urban rather than rural locations.

The results also suggest that Alaska Natives are less likely to support wilderness designation compared to non-Natives, although this result is not statistically significant, likely due to the small number of Alaska Native respondents in the study.

Attitudes and Policies

Alaskans who oppose more recommended Wilderness designation in the CNF exhibit positive attitudes toward resource utilization activities including logging, mining,

Table 4—Characteristics of Alaska Wilderness proponents and opponents (source: Chugach National Forest Planning Study 1998).

Characteristic	Wilderness supporter	Wilderness opponent
Demographics		
Years lived in Alaska ^a	19	26
Years lived in community ^a	13.5	19
Age ^a	41.0	47.7
Gender ^a		
Percent male	52.5	73.4
Percent female	47.5	26.6
Residence ^b		
Percent urban	55.2	44.8
Percent rural	46.5	53.5
Education ^a		
Percent college graduate	46.0	33.6
Race		
Percent white	48.6	51.4
Percent Alaska Native (n = 28)	35.7	64.3
Landscape values		
Highest ranked	Life sustaining Aesthetic Biological diversity	Recreation Economic Life sustaining
Lowest ranked	Cultural Historic Economic	Spiritual Cultural Learning
Attitudes toward public land uses (selected)		
Commercial logging ^a	Oppose	Favor
Commercial mining ^a	Oppose	Favor
Motorized recreation ^a	Oppose	Favor
Oil and gas drilling ^a	Oppose	Favor
Communication sites ^a	Oppose	Favor
Policy issue positions		
Building new roads ^a	None to a few new roads	A few to many new roads
Snowmachine area use ^a	Current level or decrease	Increase areas available
ATV/ORV use ^a	Current level or decrease	Current level or increase
Wild and Scenic Rivers ^a	All possible rivers	None or a few rivers
Timber harvest levels ^a	Decrease harvest levels	Increase harvest levels

^a Significant difference $p < 0.05$.

^b Residents of Anchorage, Fairbanks, and Juneau were classified as urban.

oil and gas drilling, motorized recreation, and placement of communication facilities. The opposite is true of individuals who support more Wilderness in the CNF.

The attitudinal differences were also reflected in potential CNF policies regarding road building, snowmachine and ATV/ORV use, designation of wild and scenic rivers, and timber harvest levels, with wilderness supporters favoring preservation options (less road building and timber harvesting with more wild and scenic river designation) over resource development options (more logging, road building, and few to none designated wild and scenic rivers).

Values

An examination of landscape values between supporters and opponents of additional recommended Wilderness in the CNF indicates strong value differences. The most important values to supporters of additional wilderness were life sustaining, aesthetic, and biological diversity values, while recreation, economic, and life-sustaining

values were the most important values to opponents of additional wilderness (see table 5). The largest differences in value rankings between supporters and opponents were expressed for economic, spiritual, and recreation values, with supporters of additional wilderness expressing higher spiritual value but lower economic and recreation values. Those favoring less wilderness ranked economic value as the second highest value out of 13, compared to a rank of 11 out of 13 for wilderness supporters.

Conclusions

Is Alaska wilderness exceptional compared to other wilderness in the NWPS? In support of the argument, one could point to the tangible differences between Alaskan wilderness and that found in the Lower 48 States: (1) wilderness areas in Alaska are significantly larger and less fragmented; (2) wilderness areas are located in ecoregions not found elsewhere in the NWPS; (3) wilderness areas receive significantly more subsistence use by both Alaska Natives and rural residents; (4) wilderness areas are the destination of a large and growing “ecotourism” market; and 5) wilderness in Alaska is managed by a set of legal guidelines from the Alaska National Interest Lands Conservation Act (PI 96-487), 1980, that provide a series of “exceptions” to wilderness management such as the construction and maintenance of cabins, the use of motorized vehicles including snowmobiles, motorboats, and aircraft, and temporary fishing and hunting camps.

Table 5—Ranked landscape values for wilderness proponents and opponents (source: Chugach National Forest Planning Study 1998).

Value	Alaska Wilderness preference	n	Mean ^a	Standard deviation	Mean ^b	Value ranking ^c	
						Less wilderness respondents	More wilderness respondents
Aesthetic	Less	295	10.95	11.82	3.23	4	2
	More	267	12.49	11.93	2.95		
Economic^d	Less	295	13.34	17.09	3.18	2	11
	More	267	3.26	7.18	4.40		
Recreation^d	Less	295	17.77	17.22	2.62	1	4
	More	267	10.55	12.16	3.27		
Life sustaining^d	Less	295	11.74	13.95	3.16	3	1
	More	267	15.09	14.35	2.76		
Learning^d	Less	295	2.34	4.17	4.49	11	10
	More	267	4.69	5.45	4.03		
Biological diversity	Less	295	10.12	11.40	3.32	6	3
	More	267	12.02	12.07	3.05		
Spiritual^d	Less	295	1.71	4.75	4.65	13	8
	More	267	6.32	9.56	3.91		
Intrinsic^d	Less	295	3.28	6.64	4.38	9	6
	More	267	6.59	11.28	3.92		
Historic^d	Less	295	2.34	4.48	4.50	10	12
	More	267	3.23	5.30	4.34		
Future^d	Less	295	6.96	11.05	3.83	7	5
	More	267	10.46	11.69	3.27		
Subsistence^d	Less	295	10.62	15.55	3.53	5	9
	More	267	5.75	11.24	4.07		
Therapeutic^d	Less	295	3.73	6.42	4.27	8	7
	More	267	6.50	8.38	3.82		
Cultural	Less	295	1.89	5.16	4.61	12	13
	More	267	1.78	3.77	4.62		

^a Mean value of scores ranging from 0 to 100.

^b Mean value of scores converted to 5-point scale (1 = extremely important to 5 = not important).

^c Ordinal ranking of values (from 1 to 13) based on mean value of responses 1998.

^d Indicates significant difference in mean value ($p < 0.05$).

To refute the exceptionality argument, one could point to technology such as the airplane, helicopter, or snowmachine that negate size and scale differences in wilderness areas. The scale of the landscape may be larger, but technology can greatly diminish the physical challenges required to access wilderness areas. Regarding the exceptionality of wilderness management, one can point to other wilderness areas in the NWPS that contain ANILCA-like management exceptions, such as the use of airplanes in the Frank Church-River of No Return Wilderness in Idaho.

If the physical size, location, ecology, and management of Alaska wilderness appear exceptional, what can one say about the social construction of the wilderness concept in Alaska? Alaskans perceive themselves to be exceptional even if the social conditions (at least within the replication corridor) appear unexceptional. Alaskans hold higher instrumental values (for example, subsistence, recreation, and economic) toward the landscape, influenced to some extent by the concept, culture, and history of subsistence in Alaska. Even as the physical necessity of subsistence hunting and fishing diminishes in postmodern Alaska, the culture of subsistence as a surrogate for Alaska Native rights and land access increases in importance. For rural and Alaska Natives, the land is a place that provides sustenance (even if only symbolic) for survival.

The Alaska Native view and the Western concept of wilderness clearly diverge. Visitors to Alaska appear disappointed to encounter Alaska Natives living in so-called wilderness areas, a situation that appears contradictory to the 1964 Wilderness Act. For Alaska Natives, the landscape is “home,” a land to be respected, but equally important, a land to be utilized. But for Alaska urbanites and visitors to Alaska, the landscape is valued as a place to recreate and enjoy the scenic beauty rather than as a place for permanent habitation or resource exploitation. This romantic view of the landscape is more consistent with the Western “received” idea of wilderness whose ideals are embodied in the 1964 Wilderness Act (Callicott and Nelson 1998).

Thus, there is a paradox of the wilderness idea in Alaska and it pertains to the Alaska exceptionality theme. Migrants (and visitors) to Alaska, particularly new professional migrants, are attracted to Alaska for the Western “received” idea of wilderness as one of the last places where the landscape is largely “pristine” and “empty.” Over time, migrants to Alaska embrace the exceptionality of Alaska wilderness, which is to acknowledge that Alaska wilderness is not, in fact, the “received” idea of Wilderness as experienced in the Lower 48, but rather wilderness that is a living and working wilderness, a “blue-collar” wilderness rather than a “bourgeois” wilderness. In the words of a colleague, “people come to Alaska as wilderness purists but evolve into wilderness pragmatists” (Rawson, personal communication). The enormity and challenges of the Alaska landscape mollify the purist wilderness ideals of newcomers and visitors. Airplanes, helicopters, and snowmachines become the pragmatic tools of the Alaska wilderness user and reinforce the exceptionality of Alaska wilderness in the NWPS.

There are three factors in combination that make Alaska wilderness exceptional in a Circumpolar North context: (1) the geographic separation of Alaska from the corpus of the country, (2) a history of significant migration and settlement from the corpus of the country, and (3) an indigenous Native population that has managed to preserve traditional land claims and subsistence rights despite the increase and political power of migrants to Alaska. No other circumpolar country can claim a similar set of circumstances. The only country that can claim a large, distinct circumpolar geographic area isolated from the more populous corpus of the country would be the country of Denmark and its territory of Greenland. But Greenland has not experienced significant migration and settlement as has occurred in Alaska.

I have raised the supposition that Alaska wilderness (as a state of mind) is exceptional—its unique geographical and historical context resulting in a different subjective response to wilderness among Alaskans. The data in support of the supposition is limited and would benefit from further research. Specifically, it would be beneficial to compare the values and attitudes of Alaskans and non-Alaskans directly using the same measurement scales. It would be beneficial to apply wilderness “purism” scales to selected resident populations in Alaska to compare with Alaska visitor ratings. And it would be beneficial to closely examine ethnic groups that have migrated to Alaska to determine if their ethnic culture bonds have been modified or become “exceptional” in Alaska.

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Wilderness and Well-Being: Complexity, Time, and Psychological Growth

Joar Vittersø

Abstract—This paper presents the argument for interdisciplinary wilderness research. The idea of interdisciplinarity is grounded in theories of emotion and psychological growth that are compatible with basic knowledge in other scientific disciplines, and in particular with concepts related to evolution. Considering humans as biological knowledge systems, designed by natural selection to solve the problems faced by our evolutionary ancestors, some attributes of wilderness are hypothesized to be associated with the quality of positive, emotional experiences. This paper assumes that psychological growth takes place when a wilderness landscape is transformed into a landscape of personal meaning. In this process, the notion of cognitive complexity plays an important role, along with the necessity of spending time on processing information. It is suggested that developing cognitive representations from the initially unorganized information provided by an unfamiliar wilderness offers an optimal context for intrinsic motivation and psychological growth.

Introduction

In the papers prepared for the conference on which this proceedings is based, there were some matters almost universally agreed upon. For example, it was agreed that an interdisciplinary approach to wilderness research is highly needed, although it was not agreed upon how exactly to do so. There were also some things that perhaps should have been agreed upon but were not. It was agreed that wilderness is a complex and potentially conflict-laden concept, but it was not agreed how to define it, or whether it should be replaced with another term. Thus, in this paper I will try to address an interdisciplinary audience, and will deliberately use the term wilderness in a “traditional” way, well aware that more proper concepts might replace it as the field matures. For instance, I will not consider political or anthropological discourses of wilderness, acknowledging that I thereby run the risk of stepping on some people’s toes.

Psychology and Benefits of Wilderness

In the psychological literature, the benefits of wilderness are well documented. That humans in general hold high aesthetical preference for natural landscapes, in particular for savanna-like scenes, is recognized in several studies (Ulrich 1993), as is the restorative effect of naturalness (Hartig and others 1991; Kaplan and Kaplan 1989). Moreover, people seem to find meaning and identity by committing themselves to nature (DeYoung 1993; Grahn 1991; Vorkinn and Vittersø 2001), and some evidence seems to exist for a positive relationship between pro-ecological values and quality of life (Gullone 2000; Jacob and Brinkerhoff 1999; Kals 1994). Several theories are offered in the literature to explain these findings, such as the biophilia hypothesis, which states that humans have an innately emotional affiliation to life and lifelike processes (Wilson 1993). Steven and Rachel Kaplan (1989) argue that fascinated attention, as provided in encounters with nature, help people recover from what they call directed attention fatigue so commonly observed in urban life (Kaplan and others 1998). Raymond DeYoung (1993) refers to the advantage of intrinsic motivation in his explanation of the benefits of nature. Although I do not oppose these theories, what I will suggest in this paper is a supplementary view of the benefits of wilderness. I will argue that we need to look at the interplay between cognition and emotion to reveal the mechanisms behind the “positive psychology” (for example, Seligman and Csikszentmihalyi 2000), often reported when people describe their experiences in wilderness, and in particular to look for the functional aspects of this interaction.

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Interdisciplinary Social Science

Committing oneself to a unifying scientific theory is one approach to becoming interdisciplinary, and the lack of such theories is a serious obstacle for an interdisciplinary social science. John Tooby and Leda Cosmides (1992: 23) are particularly critical about the lack of such integrating principles:

After more than a century, the social sciences are still adrift, with an enormous mass of half-digested observations, a not inconsiderable body of empirical generalizations, and a contradictory stew of ungrounded, middle level theories expressed in a babel of incommensurate technical lexicons.

On the other hand, the situation in the natural sciences is taken by these authors as an example of how reliable and deeply satisfactory human knowledge can become. Being integrated into an increasingly seamless system of interconnected knowledge and relevance, disciplines such as physics, chemistry, biology, and geology have witnessed an extraordinary fluorescence throughout the 20th century because of a genuine unity in underlying theory. Actually, Tooby and Cosmides argue that the disciplinary distinction within natural sciences is more out of educational convenience and institutional inertia than out of theoretical barriers.

The goal of an interdisciplinary wilderness approach sought here is relating the explanatory principles of human experience with the explanatory principles in other scientific fields. Primarily, this is done by recognizing that the human mind consists of a set of evolved information-processing mechanisms instantiated in the human nervous system and that these mechanisms are adaptations produced by natural selection (Bandura 2001; Funder 2001; Oatley and Johnson-Laird 1987; Pinker 1997; Tooby and Cosmides 1992).

In particular, theories of complex systems and how they adapt by development and interactions with their surroundings seem a promising core of such a unifying theory. In its broadest outline, some general principles about adaptive complex systems do exist that are able to guide our understanding with regard to how the solar system was formed, the geology of the earth, and the biology of organic organisms. For human beings, the rich complexity of each individual is produced by a cognitive architecture, embodied in a physiological system that interacts with the world that surrounds it. In other words, ecosystems, immune systems, and central nervous systems share many of the same features related to matter, energy, and information (Holland 1995).

This paper will proceed with a short outline of the basic principles of human cognition, emotion, and motivation, based on the principle that information processing generates experiences. Acknowledging that human well-being is founded in subjective experiences, the link between these principles and the quality of a wilderness experience should be rather straightforward.

Emotions and Subjective Experiences

To account for subjective experiences and psychological growth, I will draw on the communicative theory of emotion (Oatley 1992; Oatley and Johnson-Laird 1987). The framework of the theory is that humans are to be understood as biological knowledge systems, an important aspect of which is emotions and feelings. Emotions are part of a solution to problems of organizing knowledge and action in a world that is imperfectly known and in which we have limited resources.

To grasp the nature of subjective experiences, it is important to recognize that emotions have functions. Emotions communicate to us, they configure mental resources, and they make us ready for certain kinds of actions. Emotions also communicate to others, thus causing changes in the modes of our interactions, from cooperation to withdrawal, conflict, or defense (Oatley 1996). Emotions thus refer to the process of adaptation in encounters with the environment, in other words, to the fate of a motivational goal that confronts a beneficial or harmful environment. In general, the functions of the negative emotions are better understood than the positive emotions. Nevertheless, the purpose of this paper is to look into the pleasant side of subjective experiences, and in particular, the subtly different positive emotions of contentment and interest.

Contentment Versus Interest

Contentment arises in contexts appraised by the organism as safe and as having a high degree of certainty and a low degree of effort (Ellsworth and Smith 1988). It functions to prompt people to savor the moment or recent experiences and integrate current and recent experiences into their overall self-concept and world view (Izard 1977).

On the other hand, interest and related emotions such as curiosity, wonder, excitement, intrinsic motivation, and flow arise in contexts that are safe, but also offer novelty, a sense of possibility (Izard 1977), challenge (Csikszentmihalyi 1997), or mystery (Kaplan 1992). According to Izard (1977: 216), interest generates a feeling of wanting to investigate, become involved, or extend or expand the self by incorporating new information and having new experiences with the person or object that has stimulated the interest.

With regard to function, then, there is an important difference between interest and contentment, such that the former works to commit an organism to a task, whereas the latter connects a pleasant experience with the present situation and one's sense of self. In this picture, interest is basically related to intrinsic motivation, whereas contentment is related to extrinsic motivation (Deci and Ryan 2001). Interest involves working on the edge between the familiar and the unknown, enabling the active person to expand his or her knowledge structure, and thus develop the capacity for organizing experiences.

The capacity for intensive experiences depends on the cognitive structure. According to Joseph Sax (1980: 112), this is what Thoreau meant in his famous essay "Walking" when he said:

My vicinity affords many good walks; and though I have walked almost every day...I have not yet exhausted them....The limits of an afternoon walk...will never become quite familiar to you.

Actually, an entire school of thought is based on the idea that a challenging, unknown, or moderately difficult set of circumstances will create a motivational state entailing involvement with that environment (Hunt 1965).

When Do We Get Interested?

More than a century ago, William James (1890: 402, cited in Rathunde 1993: 62) observed that:

...millions of items in the outward order are presented to my senses which never properly enter into my experience. Why? Because they have no interest for me....without selective interest, experience is an utter chaos.

Cognitive psychologists have adopted James' notion of selective attention and created a discipline that describes in great detail how things that are noticed shape our minds. Less often is the motivational question of why asked. However, in experimental psychology from Berlyne (1960) and onwards, "complexity" and "novelty" have been observed to catch our attention. We still need to learn more about the factors determining why some complex objects catch our attention while others do not (during an ordinary day we run into a lot of situations or stimuli that are potentially complex to us), but two important conditions for interest are constancy and change (Rathunde 1993). Wilderness environments are affluent with regard to both constancy and change and should thus provide almost perfect surroundings for eliciting feelings of interest.

Another important factor that only recently has been considered, is "time." It takes time to process information, and the more complex patterns of information to be dealt with, the more time is needed to do the computation. According to recent thinking in cognitive science, complexity can be defined as a function of the time required to process a certain amount of information (Bennett 1988). In other words, complexity is related to the throughput, not the output. What makes something interesting is probably the very process of transforming unfamiliarity into familiarity and not the unfamiliar or familiar stimuli as such. My speculative hypothesis, then, is that what wilderness provides in terms of being able to catch peoples' interest is a frame of mind allowing people to take the time necessary for them to get

involved with the often time-consuming task of untangling a complex pattern into something that gives meaning.

Interest and Wilderness

“Time is but the stream I go a-fishing in,” Thoreau said, and paraphrasing Oelschlaeger (1991), Thoreauvian time is organic, a temporal flow to be enjoyed immediately. Such a time concept contradicts that of the modern world view, and if it can be promoted by wilderness, it might be one of its finest contributions to psychological growth. Moreover, wilderness invites us to intensively experience rather than intensively use. Encountering arctic ecosystems, humans are on their own, discovering what is interesting and going at their own pace. According to Sax (1980), wilderness provides a contrast to the familiar situation in which we are bored unless someone tells us how to fill our time. In well-known ideas of wilderness, expressed for example by Henry David Thoreau, John Muir, or Aldo Leopold, the notion of living a simple life in close contact with Mother Nature stands in sharp contrast to the almost thoughtless hedonism dominating the materialistic ideologies of modern societies. Thoreau (cited in Oelschlaeger 1991: 153), for instance, wrote:

I wanted to live deep and suck out all the marrow of life, to live so sturdily and Spartan-like as to put to rout all that was not life.

It is interesting to note that research on happiness and subjective well-being is beginning to disclose some psychological costs of a modern lifestyle. Several studies now report a negative correlation between a materialistic attitude and subjective well-being (Ahuvia and Friedman 1998; Csikszentmihalyi and Schneider 2001; Keng and others 2000; Myers 1999; Swinyard and others 2001; Wright and Larsen 1993). Moreover, studies done by Csikszentmihalyi and his colleagues reveal that children from the most affluent families tend to be more bored, less involved, less enthusiastic and less excited compared to less well-to-do children (Csikszentmihalyi 1999: 826). Based on these findings, one might speculate whether the affluent modern life deprives its residents of developing the necessary capacity for positive but nonhedonistic experiences of some duration. It is against this context that the wilderness experience proves valuable in terms of creating in humans exactly that capacity for organizing positive experiences and lasting commitments to central values in one's life. Given that wilderness offers novel and complex stimuli, and a recreational mode that allows for an interested and lingering attitude toward the elements of the setting, it has the potential of framing what we might call psychological growth.

Conclusion

In this paper I have argued that a possible avenue for interdisciplinary wilderness research is to provide explanations that are integrated with established scientific theories. In the current presentation, it is recognized that the human mind consists of a set of evolved information-processing mechanisms instantiated in the human nervous system, and that these mechanisms are adaptations produced by natural selection. More concretely, it is suggested that emotions serve motivational functions, and that different emotions serve different purposes. In this respect, the feeling of interest plays a crucial role in attracting attention and to committing individuals to purposeful goals and life tasks. It was speculated that wilderness offers novel and complex stimuli in a context without the pressing time constraint that normally dominates modern lifestyles. In addition, time is crucial for a meaningful interpretation of novel stimuli, and thus for cognitive growth. Hence, the time rhythms of arctic ecosystems might be an important resource for psychological growth.

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Social Construction of Arctic Wilderness: Place Meanings, Value Pluralism, and Globalization

Daniel R. Williams

Abstract—This paper offers a social constructionist approach to examining the nature and dynamics of arctic wilderness meanings and values. Viewing wilderness as a socially constructed place responds to growing critiques of modern “Enlightenment” views of nature and society in three ways examined here. First, wilderness landscapes are seen as geographically organized and socially constructed into places that carry a plurality of meanings. A spatially rich understanding of landscape meanings goes beyond instrumental or utilitarian meanings of nature to legitimize a broader and more intangible array of landscape meanings. Second, resource management practice, historically anchored in resource utilitarianism, is poorly equipped to address and adjudicate among competing meanings and values of places because it employs a monistic (economic) theory of valuation. A post-Enlightenment perspective for valuing environmental goods conceptualizes valuation as a social-spatial and communicative process for the production and distribution of goods. Such a process does not simply reflect existing individual values, but potentially creates and improves public values. Third, the paper builds on geographic and social theory to discuss the ways in which conflicts over meaning and value of wilderness are significant consequences of globalization. Globalization can be understood, in part, as a process in which market norms are increasingly used to regulate more and more social interactions that previously were produced and distributed by nonmarket means. This paper concludes by arguing that understanding the ways in which wilderness meanings and values are socially constructed and contested is necessary for effective protection and management of wilderness.

Introduction

The purpose of the gathering in Anchorage, Alaska, was to examine the compatibility of divergent, if not competing, values of wilderness and protected landscapes in the Circumpolar North. My approach to this paper is to connect certain themes that have guided my own work—the social construction of place, pluralistic theories of value, and globalization—to the objectives of this international seminar. As I interpret these objectives, this seminar asks four questions:

1. What is our current level of knowledge about what “wilderness” means to a given culture?
2. How do different societies and parts of society value wilderness protection?
3. What are the likely current and future threats to the various meanings and values of wilderness in the arctic?
4. What trends in the arctic region are impacting traditional, ecotourism, and ecological values of wilderness?

My previous work has not been focused on the arctic context enough to offer very specific insights on these questions. Instead, what I hope to provide is some theoretical context and commentary to frame further inquiry. As a first step in framing these questions, I need to say something about how our modern understanding of concepts such as wilderness, nature, culture, and society, and hence how our assumptions about ecological, tourist, and indigenous values, are rooted in Enlightenment thought.

The Enlightenment refers to the emergence of an “age of reason” in European thought that dates to around the beginning of the 18th century and corresponds loosely with the industrialization of Europe. It is associated with a particular orientation toward the world (for example, scientific and human progress), an industrialized and market-oriented economic order, and a nation-state model for political

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institutions and practices in which political legitimacy is based on reason rather than force or tradition (Giddens and Pierson 1998). The Enlightenment thus fostered certain views of nature and society that we often take for granted today. In Enlightenment thought, nature is understood as something mechanical and therefore reducible to a set of "clockwork" parts. The meaning and value of nature is limited to uses and commodities as opposed to essences or, as Max Weber so famously cast it, the effect of modern science is to disenchant the world (see Harrington 1996). Similarly, collective society is conceived as an aggregate of individuals liberated from local ways of life, community mores, and parochial traditions. Individual identities are seen as built around individual expressions of preference and desire.

Much of social and political theory of the late 20th century was prompted by critiques of this Enlightenment legacy. For our purposes, one particularly important critique is the way in which the Enlightenment has marginalized modern notions of space and place (Agnew 1989; Entrikin 1991; Sack 1992). In advancing universal principles over parochial tradition, the world we inherited from the Enlightenment is seemingly placeless (Shields 1991). For example, geographer John Agnew (1989) traces a deeply rooted "eclipse of place" to Enlightenment ideas, emphasizing national scale processes, placeless national society over place-based community, and the detachment of people from places through the commodification of (among other things) land. Similarly, Entrikin (1991) chronicles a decline in the geographic study of place to an apparent homogenization of world culture, a belief that studying particular places is somehow "parochial" and the tendency of the scientific method to seek generalization.

Agnew and Entrikin are in the vanguard of what amounts to a geographic turn in social thought that seeks to "re-place" the world by challenging the Enlightenment's universalizing perspective in the realms of science and epistemology, meaning and culture, and politics and ethics. In the epistemological realm, for example, Enlightenment science gives preference to abstract, universal laws. In contrast, those seeking a "re-enchanting" science advocate a more holistic view of phenomena (Harrington 1996). Thus, place represents a kind of holism (similar to ecological science) and a rejection of the mechanical view of the universe. Similarly, in the universalized cultural realm, which tends to elevate society over community, much of the enthusiasm for place comes ironically from both romantic antimodern praise for local community and skeptical postmodern celebration of "local" differences. In the ethical-political realm, Enlightenment ideals emphasize nation states, universal rights, and individual liberty and sovereignty over parochial authority. In a "re-placed" Enlightenment, even global politics and ethics are spatially structured as people find "themselves in geographic proximity and economic interdependence" (Young 1996: 126) and must coexist in shared space even if they don't share much else (Healey 1997).

Modern social and political inquiry, then, has been forged in a contest between optimistic and pessimistic views of the Enlightenment. Those holding the optimistic view see the Enlightenment as progress and express confidence in science and technology and the rational world order it engenders. To the optimists, modernity creates high standards of living, a global economy and culture, and universal moral principles in contrast to retarded local economies and communities mired in narrow parochial interests and oppressive moral conformity. Place, understood as little more than location constituted as bundles of reproducible attributes, allows for more efficient production and consumption. Thus, some see modernity and even postmodernity as liberating identity from the local and parochial, thereby creating opportunity and power for those who have had little voice in the past.

For the critics, the Enlightenment has come up short of its promise of universal emancipation. According to the pessimistic view of Enlightenment, and modernity more generally, there are important virtues in a traditional sense of place and local community. The pursuit of universal principles of truth and justice have come at the expense of local culture, community, and difference. Geographic homogeneity, like other "monocultures," brings social and technological risks. Similarly, with the loss of community and place we lose local variation in meanings and forms (for example, placelessness and mass culture). Thus, what for the optimist is the efficiency of standardization is to the pessimist a bland retail landscape in the form of chain-store malls and freeway culture. While the Enlightenment provides a unifying framework, the modern world that follows in its wake diminishes our capacity

to record feelings and experiences of place and eschews the unique character of each place. The rise of mass culture and geographic mobility homogenize the cultural landscape and weaken attachments to local place.

Achieving compatibility among ecotourism, ecological, and traditional values of wilderness is tantamount to resolving the contradictions inherent in Enlightenment thought. Many in the environmental community, for example, struggle with these contradictions as they want to be at once modern in their enthusiasm for science, strong centralized government, and the search for universal justice, while at the same time antimodern as expressed in their concern for decline of local tradition, marginalization of local and indigenous cultures, and the degradation of ecosystems (Torgerson 1999). These contradictions can be seen in the way proponents of each of these wilderness values have appropriated the idea of wilderness in their desire to constrain modern civilization in some way.

First, recognition of touristic or experiential values of wilderness is exemplified in the early 20th century wilderness movement, which saw wilderness as the crucible of American character. Such a view reflects a romantic critique of Enlightenment treatment of nature. The recreational use of wilderness became a modern ritual for reproducing the character-forming experience wilderness enthusiasts associated with the American Frontier (Nash 1973). Though leaders of the wilderness movement sought limits on the spread of modern civilization, they were perhaps unwitting accomplices in the modern machination to commodify nature. They employed modern modes of thought and governance to protect wild nature by cordoning off pristine pieces into protected status. By emphasizing wilderness as specifically “designated” places for moderns to seek reconciliation with nature, and by putting wilderness on the map as places to escape modern civilization, they tamed nature as surely as the loggers, miners, and road builders.

Second, some have embraced wilderness protection in response to ecological critiques of the Enlightenment tendency to commodify nature. By this reckoning, wilderness is to be valued as an ecological preserve rather than as a character-building playground. But here again we can't escape some contradictions. Ecological arguments for wilderness sometimes have difficulty fitting humans into the landscape (Cronon 1996a) and perpetuate the myth of pristine nature “untrammelled” by humans (Denevan 1992). In both views, playground and preserve, indigenous human influences are frozen in time or eradicated altogether.

This draws attention to a third way in which wilderness is positioned relative to the Enlightenment. For those people who speak of and for traditional and subsistence cultures in the north, there is a desire to set limits on the tendency of modern civilization to annihilate local traditions (Torgerson 1999). Ironically, the effect of wilderness protection, while dehumanizing the landscape, may also constrain modern civilization's tendency to colonize local culture and tradition. Still, definitions and management prescriptions for wilderness, generally motivated by touristic and ecological concerns, sometimes see traditional uses as nonconforming uses or attempt to limit traditional uses to traditional technologies.

Arctic wilderness, it would seem, is very much caught in the contradictions of the Enlightenment, between a universal and particular view of the world. For example: Is wilderness a modern, universal spatial category that can be applied to landscapes throughout the world? Is there some common, trans-Arctic meaning or value to wilderness? Are there universal qualities, meanings, or values we can identify or apply throughout the Arctic region? Or is wilderness the product of a particular cultural construction of nature? Should we focus on what is unique to a particular landscape, whether it is wilderness or not, protected or not? Does or will wilderness advance local (indigenous) meanings of landscapes and places or annihilate them? Does wilderness protection halt the homogenizing forces of modernity and globalization, or is it an extension of this process by homogenizing local places, for example, by marketing their universal properties as exemplars of protected arctic nature?

These broad questions surround the specific question of the compatibility of three major kinds of wilderness value being discussed in this seminar (ecological, touristic, and traditional), and at first blush seem to challenge the wisdom of “making” wilderness, identifying its meanings, and tallying its value. But one can be critical of the Enlightenment without necessarily abandoning the Enlightenment altogether. As Entrikin (1991) argues, we may be able to find some point of view between the

universal and the particular, at once informed by a universal and rational discourse, but also historically and spatially specific. Entrikin reminds us that neither perspective (universal/global nowhere or traditional/local somewhere) provides adequate access to empirical and moral truths. Perhaps we can begin to resolve the divergent values of wilderness from such an epistemological position. With these ideas as a background, let me now address more directly the theme of the seminar with respect to the social construction of place meanings, the pluralistic nature of valuation, and the transformation of meanings and values by the forces of globalization.

Social Construction of Wilderness Places

The same intellectual shifts that have given rise to a geographic turn in social and political thought have advanced a social constructionist view of wilderness (Cronon 1996b; Greider and Garkovich 1994). A constructionist approach to wilderness—anchored in the sociology of knowledge, interpretive sociology, and much of what now passes as postmodern epistemology (Burr 1995)—addresses the historical, cultural, and political processes by which humans seek out, create, and contest specific wilderness meanings and how these meanings, in turn, structure social actions in and with respect to those places. The designation of wilderness landscapes in America is a case in point. The Wilderness Act of 1964 was subject to lengthy social and political negotiations that eventually resulted in a formal legal definition of wilderness. This legal definition, complete with use and management prescriptions, now shapes the way these landscapes are used, experienced, and ultimately modified.

A social constructionist approach to wilderness meaning is a dynamic and twofold process. It involves the interplay between representing or mapping meaning (for example, wilderness assessments and management plans) and managing that landscape guided by this assessment of meaning. This creates a dynamic landscape with meaning and action coevolving over time. Furthermore, the social construction of meaning tends to generate multiple representations of a given landscape. Conflicts are inevitable with multiple communities (for example, environmentalists, tourists, and indigenous people) offering multiple representations of a single place. And even if society somehow manages to successfully negotiate among these competing conceptions, there are few guarantees that places will conform to the negotiated image as large-scale environmental changes precipitated from afar (for example, oil spills and wildfire) alter the landscape in unanticipated ways. Social constructionism doesn't mean humans necessarily get their way.

The notion that landscapes, including wilderness, are socially produced suggests that their meaning is anchored in history and culture and not simply some enduring, objective, or visible properties. The point is not to deny the existence of a hard reality “out there,” but to recognize that the meaning of that reality is continuously created and recreated through social interactions and practices. For example, the frontier and pioneer history of the United States is critical for understanding the meaning and management of public forests, wilderness, and National Parks. Early American settlers “constructed” a pristine landscape empty of civilization. They settled a vast and “unoccupied” continent that, from Anglo-European eyes, was initially seen as devoid of meaning apart from the instrumental uses that could be extracted from it. The specific meaning of any particular place was, in effect, very thin to start with. Landscapes were seen as mere “resources,” which lacked any historical or cultural significance until Europeans occupied it. Slowly, the American landscape has taken on more and more cultural and symbolic meanings. Sparked by romantic visionaries such as Thoreau and Muir, the wilderness and the frontier began to symbolically represent American civilization (and the civilizing of a primeval landscape). Recreational use of wilderness and nature became a ritual for reproducing the frontier experience and what was taken to be American character.

In the absence of a long history of making places, Americans have great difficulty legitimating emotional, symbolic, or sacred meanings, and instead tend to seek a “rational” basis for resource allocations (Williams 2000). The history of public resource management is one of dividing up the landscape into tracts for various uses. Initially, this was largely a *laissez faire* process of disposal of the public land to private, utilitarian uses. For those remaining lands that were not transferred to private ownership, Americans developed highly bureaucratic and rational processes

of allocating specific uses to specific tracts of land. Lacking deeper historical and cultural meanings, Americans were free to employ criteria of utilitarian efficiency to guide land use allocations. Only after extensive settlement of the land, with more and more of the land cultivated and civilized, could they imagine a symbolic value to “preserving” as opposed to “using” the land. As they began to associate the frontier with the American character and experience, portions of the land began to take on symbolic value as wilderness. Thus, only as they created history could they sanctify places in the American landscape, and even then they often sought a more utilitarian reason for such actions.

Now these Anglo-European constructions of wilderness are further challenged by any number of groups, including indigenous people (Callicott and Nelson 1998). On the one hand, this romantic image of wilderness has at times been an excuse for the forced removal of indigenous people. On the other hand, environmentalists have often appealed to a presumed common ground of ecocentrism with indigenous people. But as Torgerson (1999) argues, western environmentalists have tended to assimilate indigenous senses of place into an ecocentric view when, in fact, much about indigenous sense of place remains uncertain and unknown to them. Such views ignore the unique relations to places embodied in indigenous traditions, ways of knowing, subsistence production, and locus of identity (Kirsch 2001). Still for Torgerson (1999) the paradox of a social constructionist view of wilderness is that while it opens a discourse on the meaning of wilderness to new voices, it also means that indigenous people find themselves offering public arguments in defense of their place that do not necessarily reflect the value that place holds for them.

Social constructionism attempts to overcome the Enlightenment tendency to reduce all meaning to instrumental or utilitarian relations between human needs and environmental properties. From a social construction perspective, landscapes embody a plurality of socially constructed systems of meaning; the totality of place meaning cannot be reduced to any single form. Different groups may emphasize different meanings, and following an earlier point, these tend to evolve over time as people create history and symbolic meaning within that landscape. But much of the difficulty for resource management has been that the more tangible meanings and values have been easier to represent in resource assessments and inventories, and in the process the more subjective, diverse, and contentious cultural and symbolic meanings have been ignored.

The Enlightenment’s narrowing influence on science and reason also impacts how meaning is perceived and understood. An Enlightenment view of science, for example, involves the abstraction of a point of view from somewhere (the place of everyday experience) to a more remote, public, and distant point of view that is virtually nowhere (Sack 1992, 1997). The process of abstraction, though profoundly useful in many cases, has two undesirable consequences that are highly relevant to examining the meanings of wilderness areas (Williams and Patterson 1996). First, abstraction is a decontextualizing process that results in a loss of local or particular meanings. The indigenous experience or meaning of a wilderness area is marginalized in the universalizing discourse of “wilderness.” This is certainly an issue in the Arctic, but it occurs whenever a landscape is “classified” as belonging to some “category.” Methods of knowing that minimize or obscure important symbolic or emotional meanings of objects, events, or places, no matter how scientific they might be, are unlikely to be well received by those who sense the loss.

Second, abstraction is a process of moving from the highly subjective but integrated experience of place, to the more public, external, and objective experience that tends to fragment knowledge along disciplinary and theoretical lines. Wilderness management has been overburdened with the abstract technical lenses of nowhere—microeconomics, management science, and linear programming. To counteract the narrowing effect of scientific abstraction, Entrikin (1991) suggests seeking points of view between somewhere and nowhere, which he describes as an epistemological position of “betweenness”—informed by scientific discourse, but also historically and spatially specific.

To summarize, wilderness in the Arctic or any other place, carries a variety of meanings to various individuals, groups, and cultures. These meanings may be generated from both a local (particular, somewhere) and universal (abstract, nowhere) perspective. Any particular tract of land we might call wilderness may be home to some “local” people, an exotic humanless “other” to foreigners and tourists, or a

genetic reservoir to scientists and environmentalists. There is no single objective condition of the landscape, such as wildness, with inexorable implications for management. Recognizing wilderness as a kind of meaning certain people give to the landscape, as competing social constructions, helps to frame the question of compatibility between traditional, ecotourism, and ecological values of Arctic wilderness. Building a shared construction of wilderness is a difficult political task. The search for compatibility must recognize that meanings vary in perspective from universal abstraction to the local and particular; are spatially, culturally, and historically contingent; and continuously reconstructed into the future.

Valuing Wilderness

Thus far, I have noted that the ideals of the Enlightenment have marginalized “place” and the “particular” in favor of the universal and general and obscured the role of the social and cultural in producing a plurality of meanings for a given wilderness landscape. Similarly, the Enlightenment conceals the diverse ways of thinking about values and valuation and the necessity to adjudicate among incommensurable values.

Reconciling the divergent meanings and constructions of wilderness is not just a debate about which meanings and values are at stake, it also involves examining the appropriate social mechanisms and institutional arrangements by which society orders, evaluates, and decides about their relative production, maintenance, and distribution. From an Enlightenment or utilitarian perspective, the best method for ordering or allocating goods is the market, an institution with rational procedures for making valuations (and in the absence of markets for certain goods, society should create artificial, surrogate markets). This approach reached its zenith with operations research thinking, in which experts would identify the “outcomes” or consequences of alternative courses of action, economists would measure their values, and linear programmers would calculate the best, most efficient alternative. Accordingly, values do not pertain to places or other holistic spatial entities, but to their useful and exchangeable properties.

Implicit in these economic approaches to value is the assumption of a single, universal yardstick for comparison of all values. In contrast, value pluralists argue that values are often incommensurable and should not be so ordered on a single dimension or standard. Going a step further, social constructionists often argue that values do not exist as such, but are emergent properties of social interaction, especially communication. A social constructionist might argue, for example, that the discourse of romantic transcendentalists such as Thoreau and Muir, and ecologists such as Leopold helped to create the value of “wilderness.” Moreover, as a result of continuing discourse, wilderness is now valued more and in different ways than it was in the mid-19th century. The discussion has even “progressed” to a point where some even question the value of the wilderness idea, particularly as this discourse has moved beyond the Anglo-American context (Callicot and Nelson 1998; Cronon 1996b).

A value pluralist such as Anderson (1990) suggests a number of different institutional arrangements for ordering values. She begins by noting that the market, like any institution or procedure for making valuations, embodies certain norms for regulating the production, exchange, and enjoyment of goods that are sensitive to some qualitative differences among values and insensitive to others. Her main concern is how to determine which goods are properly the subject of market transactions (and by implication market valuations) and which are not. The task of reconciling the diverse values of arctic wilderness is not just a task of identifying possible goods (values or benefits) that might accrue from wilderness protection (for example, carbon sequestration, human development, or the preservation of subsistence cultures), but also a question of the appropriate means by which society should decide among the production, distribution, and maintenance of these various goods.

She describes four modes for the valuation of goods and the corresponding social norms that regulate these different types of exchange (summarized in table 1). The key feature of the use or market mode, of which we are most familiar, is that it involves subordinating something to one’s own ends. Market norms of exchange include: (1) impersonal relations (transactions with strangers), (2) freedom to pursue

Table 1—Modes and norms for valuation of wilderness (source: Anderson 1990).

Modes	Norms of social relations/exchange
Use/market	Impersonal, advantage, taste, exclusive and rival, exit
Intrinsic	Respect, acceptance
Personal	Intimacy, attachment, gift, commitment
Shared	Fraternity, need, mutual benefit, voice

one's own advantage unrestrained by consideration of others' advantage, (3) equating values to matters of personal taste, (4) where goods exchanged are exclusive in consumption and rival in competition, and (5) where dissatisfaction is expressed by exit from the market. Even though we recognize that not all values (goods) are exchangeable in market transactions, a key assumption of economics is that there is a single yardstick upon which all values can be measured and ordered. This amounts to a monistic theory of value in which everything can be ordered as some kind of tradeoff.

Market norms can be contrasted with three other valuation modes or sets of social norms for regulating the production, distribution, and maintenance of goods. One alternative is what she calls the intrinsic mode. Intrinsic norms deal primarily with respect and acceptance of the object as it is, rather than for how it can be used. Here is where we would likely locate ecological and aesthetic values, as well as the intrinsic value of indigenous cultures. We can, as economists have shown, identify the economic value of such goods using contingent valuation and other pricing techniques. But this is nevertheless an act of subordinating their intrinsic value to an economic end. To illustrate, economists who were asked to assess the damage to certain villages caused by the Exxon-Valdez oil spill concluded that the damage could be estimated as the cost of relocating the entire village to an undamaged location (Snyder and others, in press). But what do we make of the value of the history and cultural forms and relations people form in a specific place? Are such values literally replaceable? Can they be monetized? This limitation is not just confined to the application of economic analyses to nonwestern cultures. Many people object to questions about their willingness to pay for clean air on the grounds that they are being asked to pay to restore that which is intrinsically good, but which has been degraded by allowing people to subordinate its value to a mere economic good. Thus, it only makes sense to ask the question of willingness to pay from within the use mode of exchange.

A second alternative involves the personal or sentimental mode of exchange. Objects, people, and places are often loved and cherished. Whereas commodities are interchangeable, cherished goods are unique, irreplaceable, and given up only under duress. In this case, the dominant norms have to deal with commitment to the relationship and expressions of identity and self. Anderson (1990) develops her ideas about this mode by discussing interpersonal relations among friends and family and the role played by goods exchanged in such relationships. Goods such as trust, loyalty, sympathy, affection, admiration, companionship, and devotion cannot be bought and sold (although she notes that people sometimes deceive themselves in the attempt). Goods such as these (exchanged in personal relationships) are guided by the spirit of gift rather than the spirit of commercial exchange. To impose market norms of exchange for these goods undermines their authenticity and worth. Gifts of love or intimacy for example, "cannot genuinely be procured for oneself by paying others to produce them or by appealing to another's personal advantage to provide them" (Anderson 1990: 186).

Extending this idea to cherished landscapes or places, part of the value of a specific wilderness to a visitor may not be a result of consuming its wilderness qualities, but as a kind of relationship one develops from intimate knowledge of the landscape built up over long and repeated interaction. Such relationships to places may be severed or lost, but like true friendship, they are not goods one can trade in for a new model. The same might be said about the value of intimate ties to place experienced by indigenous cultures. In the context of indigenous claims of cultural losses due to environmental damage or forced displacement from homeland, an indigenous culture's relationship to place involves a sense of belonging and identity that is

difficult to reconcile within western market institutions and property rights regimes (Kirsch 2001; Snyder and others, in press).

The third alternative mode deals with value as public symbols and expressions of shared ideals. This is the political mode of valuation. As Anderson (1990: 181) notes, some “values cannot be realized in private acts of use, but reside in shared public understanding of the meaning and significance of the good.” As an example, Anderson describes sites of historical events as having value as part of national heritage. Preservation of these values requires constraints on use, such as zoning ordinances to preserve the architectural integrity of the features and buildings associated with such sites. The norms for these shared community relationships contrast sharply with the norms of the market. These norms include fraternity in place of self-interest, mutual benefit in place of exclusive use, need over want, and voice instead of exit as the expression of dissatisfaction.

Fraternity is expressed through common provision of services, in contrast to the separateness of parties in a commercial transaction or the special relationship between parties in personal gift relationships. Publicly provided goods are provided to all, not just to those who pay. Shared goods are necessarily realized in common activities, and rights to these cannot be fully distributed in exclusive increments. When goods being distributed are not public, distribution takes place in accordance with some conception of the relative need of a citizen rather than in accordance with want. Finally, citizens participate in the allocation of goods based on voice rather than exit. The appropriate determination of need is based on reason and democratic deliberation. For example, Anderson compares the way respect is given in market versus political relations. In market transactions, one respects the privacy of the consumer by not inquiring into the reasons for wanting something beyond a level necessary to satisfy that want. In public transactions, respect for fellow citizens is to take their reasons for advocating a particular position seriously. Public goods are produced and distributed through institutions and practices that deliberate over the shared concerns of citizens. In contrast, market mechanisms of exit do not respond to reasoned ideals any differently than from unreflective wants. The realization of shared values requires a public forum for working out these understandings together.

Attempting to order these shared goods by market mechanisms tends to detract from their value. In an argument reminiscent of Olmsted's views on public parks, Anderson notes that the goods provided by public spaces are qualitatively different than if they were provided privately. Public space promotes the free and diverse association necessary for fraternity, civility, and democracy (see also Putnam 2000). With a private system of roads, for example, one would need to ask permission of each owner to visit people and places made accessible by such roads, thus creating potential restraints on the freedom of association that forms the bedrock of democracy. Anderson reminds us that we have inherited from the Enlightenment a narrow conception of valuation as something technocratic, expert driven, utilitarian, efficient, and instrumental.

Not only is our market/use concept of value overly narrow, it tends to colonize all other modes of valuation (Anderson 1990; Wolfe 1989). Intrinsic, personal, and shared modes of valuation constitute constraints on use. In capitalist societies we tend to value the dismantling of these constraints to “free up the market.” Modernization can be understood, in part, as a process in which market norms are increasingly used to regulate more and more social interactions that previously were produced and distributed by nonmarket means. An important tool for deciding about the production and distribution of these various goods is vigorous, reflective public discourse. This kind of deliberation can create and improve public values, and is an essential feature driving the growing movement toward collaborative decisionmaking in natural resource planning.

Recognizing values as ephemeral products of social discourse enlarges and democratizes public decisions, as reasoning and reason giving are expanded from economic and technical experts to all citizens. Still, the mere act of defending the value of a place through deliberation and public reasoning risks changing these very cultural values. Noting that cultures change when politicized, Torgerson (1999: 202) writes: “An image of place, to defend itself, must speak out, must come out into the open, into the forum.” Just as taking an exclusively market view of values suppresses the search for a public or citizen understanding, defending any particular value of

wilderness—indigenous, ecological, or ecotourism—involves assigning political meaning to that landscape and thereby changes how it is valued.

Globalization and Wilderness

Having described the social construction of wilderness, as the production and contestation of a multiplicity of meanings and compared various modalities for ordering or valuing environmental goods, the two remaining objectives of this seminar/workshop relate in one way or another to describing social forces of change and their consequences for Arctic wilderness. One way to organize or think about the trends or threats affecting Arctic wilderness is to think in terms of large-scale social processes, specifically globalization. First, I want to address the question of how modern social processes (globalization) impact the meanings and values of wilderness. Second, I will briefly illustrate how this process might be affecting the meaning and value of natural landscapes in Norway.

Globalization refers to the restructuring of time-space relations through rapidly accelerating rates of exchange, movement, and communication across space, and contributes directly to the unmooring (disembedding) of meanings and identities from place. Globalization tends to thin out and destabilize place meanings, and aggravates conflicts over how places or natural landscapes should be developed and managed. In a premodern (preglobal) era, local conditions were more predominant as constraints on how people adapted to and fashioned their world. Exploiting nature was limited by local knowledge, and the quantity and quality of locally available natural resources constrained economic and social activities. This tended to produce isolated local cultures with social patterns necessarily fitted to the contingencies of that place. This didn't make humans benign by modern ecological standards, as Soulé (1995) reminds us. Rather, the scope and scale of human-environment interactions were more directly embodied in a place. In other words, societies were adapted to the opportunities and constraints of local place.

Nurtured by Enlightenment thinking, modern industrial development freed production activities from the constraints of local place and began a process of transforming places around the logic of market economics. Modernization (whether in the form of industrial markets, mass communications, or more efficient transportation) has in an important sense “freed” people from constraints of place, or in economic terms, allowed for more efficient use of resources. As described in the earlier discussion of the Enlightenment, this has had profound implications for both nature and society. Whatever inherent moral value nature may have possessed in the premodern era, it has been supplanted by a view of nature as an instrumental resource to be exploited. Similarly, individuals were liberated from local ways of life, community mores, and parochial society. Thus, social theorists recognize that modernity—as the unmooring of social relations, production and consumption, and even our identity from particular places—also leads to greater freedom to contest the meanings we ascribe to both our immediate and more distant surroundings. Just as material life is no longer bound by local ecological limits, modern social norms and practices have become increasingly the province of the sovereign consumer/voter. While much has been gained in terms of material well being and individual autonomy and liberty, modern social relations have also led to the displacement of local, community norms and standards of behavior by individual preferences as expressed in the marketplace or the voting booth (Wolfe 1989). Thus, the meaning of a place (such as wilderness) is increasingly subject to a kind of ideological marketplace with all of the competition and instability that goes with it.

Increasingly modern ways of living involve circulating through geographically extended networks of social relations and a multiplicity of widely dispersed places and regions, yet much of our traditional concepts and frames of reference presume that people and cultures are normally rooted in one place. In a globalized age, meaning is increasingly created in a spatially decontextualized world of mass consumption and mass communications, a world in which market forces create and transform meaning at a rapid pace. Globalization partitions space into smaller and finer units and assigns specialized meaning to each. “From the fewer, more local, and thicker places of premodern society, we now live among the innumerable interconnected thinner places and even empty ones” (Sack 1997: 9). Globalization creates a tension

within local places, between searching out ever-wider spheres of exchange and movement, and simultaneously provoking an inward and deliberate search for authenticity, a conscious effort to evoke a sense of place and connectedness. It makes “place-bound” identities more salient as the homogenizing forces of globalization spur the search for an authentic stable place, which is otherwise threatened from the “outside.” Place meanings are less and less prescribed by local culture and tradition, and instead meanings are plural, individualized, and more contestable.

In places like Norway, where contact with nature has been central to national and cultural identity, any change, loss, or thinning of traditional meanings and values associated with natural landscapes is likely to be especially troubling. In Norway, people feel their distinctive outdoor traditions are increasingly threatened by globalizing forces of European unification and rapid urbanization. As Norwegian anthropologist Eriksen (1997) argues, through their power to ritualize the cultural memories of rural Scandinavian life, outdoor traditions provide a way to shelter one’s identity from changes associated with an increasingly multiethnic, urbanized, and globalized culture. Thus, Norwegians express concern that the growing use of natural landscapes as nature-tourism destinations by the rest of Europe will interfere with these traditions (Kaltenborn and others 1995). Globalization has the effect of pressing in on traditional forms of nature contact and weakening them as they become the commodified interest of ever more spatially and culturally distant social groups. As a result, the national significance of cultural myths and practices are magnified and even exaggerated, yet the modern world inevitably dilutes their meaning as they become commodities to the rest of the world.

One such tradition in Norway and the other Fenno-Scandinavian countries is “allemannsrett” (every man’s right), which involves the right to roam relatively freely through most any uncultivated landscape regardless of ownership. It can be thought of as a “free space” of public rights to the land beyond the private economic/use rights (Sandell 1995). It is a type of common pool resource that allows anyone the right to traverse, camp, and collect edibles and small wood, but does not allow one to hunt, drive a vehicle, or collect materials of commercial value. Yet, as Kaltenborn and others (2001) argue, this traditional practice is being constricted by globalization (see fig. 1). Allemannsrett evolved in a “premodern” context where population densities were lower and travel was much more localized. One impact of globalization is that it simply makes it easier for distant people to take advantage of local opportunities, making the public commons more difficult to sustain. In addition, the “free space” of public rights is being squeezed by the increasing commercialization and commodification of what were formerly noneconomic goods (Sandell 1995). Tourism is a good example. Commercial outfitters can potentially guide or host clients on private property, earning a living while paying nothing to the landowner. Other sources of decline involve the increasing fragmentation and specialization of land use. Smaller, more intensively managed parcels leave little “free space” left over between smaller and more completely exploited parcels. Finally, not unlike the controversy over subsistence uses of wilderness in Alaska, creating nature protection areas usurps traditional rights of access by promulgating more restrictions on how the landscape can be used.

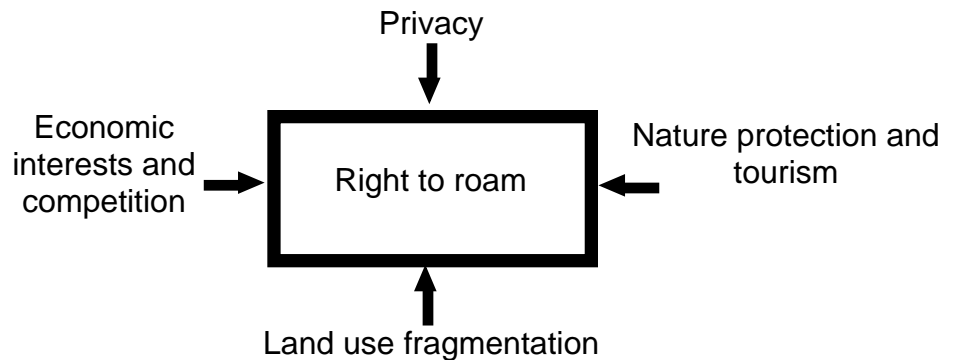


Figure 1—Globalization and Scandinavian public access to nature (source: Sandell 1995).

Globalization amplifies the importance of traditional forms of nature contact for those cultures that see it as part of their identity. At the same time, globalization allows more people to seek out and contest these same values. In other words, modern ways of living and traveling allow more people to access wilderness meanings and values and in the process appropriate and transform them for their own benefit. More people defining what a place (such as wilderness) means, destabilizes “traditional” meanings and intensifies conflict. Globalization makes even the most remote and little used wilderness landscapes important sites for cultural or identity politics. This returns us to some perplexing questions for wilderness. Is wilderness a way to reconnect modern identities to nature, place, and traditional lifestyles? Can wilderness facilitate maintenance of ancestral ways of life in a global world? Or is wilderness just one more piece of ground segmented and organized by modernity and thereby diluted of traditional meanings?

Conclusions

The mere examination of topics such as wilderness meanings and values, indigenous cultures, and cultural differences reflect a uniquely modern concern. These things are made problematic by globalization as the meanings and values we hold for cherished places and landscapes are most evident to us when they appear to be threatened from the outside. From the theoretical perspective of social constructionism, a major impact of modernity and globalization is to destabilize and thin out the meaning of places. In addition, this perspective helps us to appreciate, understand, and accept that even wilderness places contain multiple and conflicting histories and that people affirm in such places multiple and conflicting identities. The accelerated pace of change we experience as globalization helps us to see more clearly that much of what we thought was inherent and enduring is really socially constructed.

A social constructionist perspective suggests that society has more or less always functioned by working through contested meanings of places, things, resources, and ideas. However, the disequilibrium that is so much a part of modernity and globalization propels this process of contesting place meanings to new levels of intensity and geographic scope. Given our collective power to make and remake places, not even wilderness can be “protected” and preserved as some premodern authentic landscape. Still, the social construction of meaning is not completely amorphous. The creation and contestation of meaning involves social interactions structured within and by interest group formation and action, regulatory agencies, administrative procedures, law, local government, planning processes, and so forth. These processes are most obvious in the formal political arena, but they also occur through everyday practices such as deciding where to vacation or retire, whether and where to build a new shopping mall or Wal-Mart, and a thousand other small decisions made by consumers, businesses, families, and government officials.

Culture provides a map of meanings through which the world is made intelligible. It is not entirely consensual or shared, as it has often been described, but is something that varies across individuals and groups and is contestable by various interests. Similarly, wilderness designation, use, and management take on different meanings for different people and, in the process of negotiation, new meanings and group identities are created and modified. Globalization makes local meanings seemingly more salient and threatened as it destabilizes what are often taken to be more authentic, indigenous meanings. This constructionist approach focuses on how meanings and values are produced and reproduced through actual social practices that take “place” in historically contingent and geographically specific contexts. The challenge is to learn how to collectively work through the largely inevitable social change wrought by globalization while negotiating across cultural differences in meanings and values, which are increasingly diverse, individualized, and commodified.

By focusing on a sociocultural view of meaning formation, we are forced to examine not just what values people hold, but where these values and meanings come from, how they vary from place to place and community to community, how they are negotiated in society, how they are used in conflict situations, how they are impacted by globalization, and how they influence policy decisions. By focusing on how values and meanings are socially created and contested and how these affect resource management systems, we can begin to cultivate social knowledge and develop management procedures to address inevitable social conflicts and differences in ways that recognize

both the distant influence of globalization and the particular influence of local historical context.

Much of the postutilitarian (postenlightenment) challenge for natural resource management grows out of the increasingly contested meanings of places and ecosystems that come with modernity and globalization. Understanding the processes of making and contesting wilderness meanings gets at the heart of natural resource conflict. The social constructionist perspective draws attention to the idea that the work of environmental scientists, managers, and planners is itself an effort that seeks, creates, contests, and most importantly, negotiates the meaning of places. As planners, this means moving away from top-down, data- and expert-driven management styles and toward more deliberative, discursive, collaborative styles. Stated more globally, we need to learn how to collectively negotiate through change and across differences. This is much easier said than done, of course, as societies have structured all manner of processes and institutions around single histories, defined boundaries, fixed categories, and reified meanings.

Exercises in mapping meanings are, by definition then, necessarily political acts in which meanings are being created and contested, with certain meanings gained and lost in the process. Social construction is often about power relations. It asks: Who gets to draw the map? As Torgerson (1999) reminds us, the ideal of open democratic discourse as an inclusive and participatory exercise to map out and debate the ecological, ecotourism, and indigenous meanings and values of wilderness places is not necessarily conducive to protecting any particular sense of place. Regardless of how one feels about the “cultural politics” that globalization engenders and intensifies (and the corresponding reduction in the power and authority of science and expertise), such politics are part of the social reality.

It is perhaps tempting to think that the meanings and values of wilderness should be defined by an elite group of scientists and well-informed activists. We would like to discover some “rational” foundation for protecting wilderness that transcends local cultural truths. But an examination of wilderness in the Circumpolar North reinforces the role of culture in shaping the very concept of wilderness. In the north, it is more difficult to disregard the role of indigenous people and traditional practices in making and remaking the landscape. The western tendency to segment lands into the universalist categories of civilized and uncivilized are much less tenable. But it is equally impossible to pretend that the universalizing discourses of western landscape meanings have no bearing on northern landscapes. Wilderness uses, meanings, and values are constructed through the ongoing contest between indigenous, touristic, and ecological discourses and practices. Wilderness in the north is a continuing amalgamation of these and other social forces.

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Growing Pressures on Circumpolar North Wilderness: A Case for Coordinated Research and Education

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Abstract—Pressures are growing on undeveloped (wild) places in the Circumpolar North. Among them are economic development, oil and gas exploration and extraction, development of geothermal energy resources, development of heavy industry close to energy sources, and lack of appreciation for “other” orientations toward wilderness resources. An international seminar in Anchorage, Alaska, in May of 2001, was the first step in providing basic input to an analysis of values associated with Circumpolar North wilderness and the constraints and contributors (factors of influence) that either limit or facilitate receipt of those values to various segments of society. This paper proposes an agenda for research, education, methodology development, and establishment of a cooperative infrastructure for accomplishment of these tasks.

Introduction

The word “wilderness” is often envisioned to be at the core of protected areas, such as parks and preserves. However, we propose that wilderness defines a range of interactions between humans and natural environments. In this, wilderness need not designate areas which are delineated and managed but rather apply to all regions, protected or not, for which people hold certain values. The process of legislation that has led to varying degrees of protection of wilderness throughout the Circumpolar North should be considered as a part of the many types of relationships communities and cultures have with natural environments. Human and biophysical variables are intimately linked, both regionally and globally. Thus, thinking of wilderness as a continuum (rather than a series of protected areas) for which appropriate research and education will lead to effective management needs to be encouraged. Moreover, expanding our spatial perception of wilderness areas to those that lie beneath water (for example, marine) and earth (for example, caves) is critical in the integrated management of the wild places of the Circumpolar North.

The Circumpolar North contains a unique community of individual countries that share some similar biophysical and sociocultural features. Some countries in the northern arctic region have established protection of wilderness through legislation or administrative policies, including Finland, Canada, Russia, and the United States (Martin and Watson, in press). Only Canada, Finland, and the United States have nationally based legislative protection, but Russia has an extensive system of strictly protected nature reserves (Laletin and others, this proceedings; Ostergren 1998) for which the Russian people are only now realizing the wilderness values (Ostergren and Hollenhorst 2000). In Iceland, recent legislation has defined wilderness and instructed regional planning efforts to consider recommendations of areas to be so protected (Thórhallsdóttir, this proceedings). While there are no officially protected wilderness areas in Sweden, Norway, and Greenland, wilderness is a common term used to describe the most remote places in these countries (Husby and Henry 1995).

Increasingly, natural and social scientists, communities, policymakers, and resource managers are being confronted with issues that revolve around how “wilderness” should be utilized and, ultimately, viewed as a component of the local, regional, and global culture perceived specifically by distinct groups of peoples. This pressure continues to grow as population growth, influence of technology, ease of access, and appreciation for dwindling natural areas become part of our identity as

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human beings. However, a collective statement of wilderness meaning and values is neither useful nor applicable to specific issues, whether they are social, political, or physical. This is mainly because the physical and ethereal qualities of wilderness vary too greatly to be discussed as a general concept (Watson and others 2001). For example, “wilderness” in the Southeastern United States may have specific constraints that reflect the political history, the inherent physical ecosystem, the historical relationships with particular cultures, and the agency policies that guide management. Such wilderness is not comparable, in the values derived or meanings attached to it, to that found in Alaska. Thus, the challenge lies not only in identifying commonalities and differences on large geographical scales (for example, circumpolar versus contiguous United States), but also in the development of methodologies that allow data to be collected from national, regional, and local populations about values and meanings associated with wilderness in ways that allow summative descriptions and comparisons across human and ecological values as basic input to societal decisions.

The purpose of this paper is to provide summary conclusions about research, education, methodology, and infrastructure needs for Circumpolar North wilderness, based on the set of papers compiled in this proceedings and followup workshops at the time of the meeting. The conclusion will offer a hypothesized matrix of wilderness values and factors of influence to guide future research and education.

Priority Research Issues

Watson and others (2001) summarized 26 research issues, identified at this Circumpolar North Wilderness Workshop, within four general categories of information needs:

1. Subsistence and other traditional uses.
2. Arctic and subarctic ecosystems.
3. Awareness and appreciation of multiple orientations toward Circumpolar North wilderness.
4. Understanding the threats to Circumpolar North wilderness character.

Subsistence and Other Traditional Uses

Wilderness research and research on wilderness values in the United States has mostly ignored the issue of traditional values associated with lands protected as wilderness, since in most cases assimilation or subjugation of native peoples has limited or destroyed cultural ties to wild places. In general, however, wilderness research has progressed from early studies in the 1960s, which focused mostly on recreation values of wilderness, to more recent investigations of societal values associated with wilderness protection and greater emphasis on ecological and scientific values (Wright 2000). Unfortunately, very little research has been conducted on the interaction between subsistence uses and other wilderness uses. Traditional recreation motivation research and recreation conflict research has little applicability to understanding and managing multiple value orientations toward wilderness resources.

The Wilderness Act of 1964 did not specifically authorize or address the issue of subsistence uses in wilderness. In contrast, the Alaska National Interest Lands Conservation Act (ANILCA) of 1980, which added 56 million acres (22.6 million ha) to the National Wilderness Preservation System, did address the issue of subsistence for those areas set aside as wilderness in Alaska. In recognition of the special relationship between rural Alaskans and public lands in Alaska, specific provisions allowing continuance of subsistence hunting and gathering were included in the Act. Historic uses, such as snowmobiles, motorboats, aircraft, and temporary fishing and hunting camps were also specifically allowed. However, considerations of the impacts of technology on both culture and natural resources in the fragile arctic environment were not extensive. Moreover, a recognition of the need for continued understanding of complicating factors such as climate change and population growth remain absent.

There is a continued need to understand how wilderness designation interacts with these activities and the meanings attached to them. Recent attention drawn to the Arctic National Wildlife Refuge by efforts to increase oil and gas exploration brought some interior Alaska native people to the conclusion that extending wilderness protection to these lands would not only meet the purposes set out in the United States Wilderness Act of 1964 and provide assurance that ANILCA purposes are met for subsistence, but in addition, would help protect the role of the caribou in maintaining the identity of some native people (James 2001). The role of wilderness in protecting traditional ecological knowledge (Huntington, this proceedings), and the value of traditional ecological knowledge in making wilderness stewardship decisions are relatively unexplored.

Arctic and Subarctic Ecosystems

Unique and fragile, arctic and subarctic ecosystems can be extremely difficult to restore (Thórhallsdóttir, this proceedings). There is currently a need to compile environmental inventories of the Circumpolar North and share information on monitoring activities across northern countries. This information is critical in order to understand the long-term effects of resident and industrial activities in the northern ecosystems, but is generally unavailable. These impacts may vary significantly in different geographical or vegetative zones of the arctic (Khitun and Rebristaya, this proceedings). Comparative studies on the levels and types of impacts on wilderness resources must extend to include local uses such as reindeer herding, hunting, berry picking, ecotourism, resource extraction, and motorized use (Gunnarsson and Gunnarsson, this proceedings; Sippola, this proceedings). Climate change impacts to vegetation and wildlife are expected to be of critical importance to the future of the people who live in the Circumpolar North. A synthesis of studies that will better forecast these changes is needed. In addition, the consideration of uncertainty in prediction, based both on data collected and perception of risk, needs to be ascertained to more effectively understand how societal behaviors may affect biophysical environments.

Of critical importance in some places is the need for methodologies to assess landscapes for ecological productivity, energy potential, and scientific uses in order to evaluate their importance for protection as wilderness (see for example, Thórhallsdóttir, this proceedings). An urgent need is to establish a hierarchy of importance for protection based on these values and a clear understanding of the factors that constrain or contribute to attainment of these values.

Generally, those countries without wilderness protection need more knowledge about the uniqueness of their own arctic and subarctic ecosystems and an understanding of the merits of protection as wilderness. This type of protection could also be extended to meet other conservation, resource utilization, or economic development goals. In an analysis of potential tradeoffs, we need to understand what the important wilderness characteristics are and how to measure them in a way that provides a priority listing of the most threatened places and characteristics.

Finally, considerations of management strategies for the marine and coastal environments of the Circumpolar North has lagged behind other areas of the world. Co-localization of human activities, ranging from industry to tourism, with these ecosystems may create critical stresses for which restoration is difficult, if not impossible. In addition, movement away from single-species management, such as that applied to fisheries, will be absolutely critical to maintaining regional resiliency and productivity.

Awareness and Appreciation of Multiple Orientations Toward Wilderness

Wilderness interpretation is a relatively new tool for accomplishing wilderness stewardship objectives (Duncan and Martin 2002). There is a need for research to support wilderness interpretation in the Circumpolar North. Such research could support efforts to create awareness and appreciation of the different orientations toward wilderness across different social groups. However, before such work is useful in the Circumpolar North, an analysis of the broad meanings and identities,

activities, experiences, and motivations for utilizing wilderness needs to be accomplished. The Wilderness Act represents a culmination of discussion and debate over the desire to keep some areas of the country available for recreation in a state closely resembling conditions found by the earliest European settlers. Leopold (1966) felt that travel by packtrain and canoe was part of the American identity, and unless some expansive areas without development in which to practice these activities were protected, we would lose our appreciation for these primitive travel skills. However, this "founding conservationists' view" reflected in the 1964 United States Wilderness Act represents just one orientation toward the wild lands of Alaska (Kaye 2000). There is an acute awareness that wilderness provides diverse experiences that reflect the diversity of American identities. Yet, few of these identities, beyond a narrow demographic reflected by the founding conservationists, have been explored or are understood. Obviously, such a marked data gap poses severe challenges for management within and outside the Circumpolar North.

There are as many different legal orientations toward wilderness in the United States as there are differences between countries. ANILCA, for example, extends legal orientation toward wilderness to include subsistence activities. This legal extension reflects the native perspective, described more as traditional relationships with these relatively intact, extensive ecosystems that are kept that way through wilderness classification. To native people, however, wilderness may be identified as a homeland, not a place without humans, confounding these multiple legal orientations. Currently, an understanding of the broad and diverse identities and meanings of the natural environment referred to as "wilderness" has not been obtained.

There is also the orientation of the relatively uninformed. Today, increasing attention is given to wild places of the United States arctic. Mass information campaigns surrounding recent debates in Congress have heightened awareness and appreciation of the threats associated with expanded mineral exploration and drilling in fragile portions of the arctic that have previously been protected. Relationships with these places are only now beginning to develop for much of the United States population. There is the fear that arguments for protection or exploration are poorly defined, largely emotional, and based on poor understanding of the many values associated with these places. There is not a single set of values, but many, associated with these places. Visitation to these areas is expected to increase due to ease of access, increased media attention, and the growing belief that they are more threatened than they were before. A largely poorly informed public exists, who have not visited and may never visit the arctic zone of Alaska, as well as an increasing number of first-time visitors attracted by the increasing debate over the future of these places.

There are certainly economic orientations toward the wild places of the Circumpolar North, as both a traditional means of livelihood for native people (Sippola, this proceedings), and as nontraditional economic stimulation through ecotourism influences on local and regional economies. Ecotourism promotion and management can pose threats to cultural identity of native people (Saarinen 2001) and to the environment that attracts the tourists, but ecotourism may also have value extending beyond the economic, including the promotion of "ownership" values, which ultimately lead to stewardship. Providing necessary services for the inexperienced, to view these magnificent places in a way that is nondestructive to the environment, can be a valuable asset for protection of those places, while also influencing the personal attitudes and beliefs of these visitors.

Another orientation is that of the Circumpolar North. Alaska, for example, while part of the United States, has a tremendous mix of indigenous and nonindigenous people and a rich history of association with Russia, Canada, and the United States. In this context, it is not only the history that is unique, but also the traditional relationships between people and the landscape that differ from elsewhere in the United States. Biophysically, the fragility of the ecosystem requires careful consideration, and the degree of integrity of ecosystems is different from much of the world. Policy actions need to be more cognizant and appreciative of the Circumpolar North orientation. There needs to be greater sharing of information between scientists in the Circumpolar North (in contrast with existing links between scientists in Alaska and the sub-Canadian United States), positive communication, and cooperation in education programs (ARCUS 2000).

Understanding Threats to Circumpolar North Wilderness Character

The increasing pressure across the arctic north to develop energy resources and to attract ecotourism, while balancing global needs, will have significant and unprecedented effects on the wilderness character and overall biophysical integrity there. There is an acute need to understand the ways in which these forces constrain receipt of wilderness values, how they impact the "functionality" of wilderness socioculturally and biophysically, and how these constraints can be mitigated so that reasonable economic evolution is not blocked. Overwhelmingly, scientists have identified a need for synthesis of literature on the major threats (internal and external) to arctic and subarctic wilderness, and are continuing work to test the success of various approaches to mitigate those threats. There is also a need for regional, national, and international comparative studies on the effectiveness of alternative management approaches to protect wilderness values, including examination of comanagement and collaborative planning and management options (Pfister, this proceedings; Stadel and others, this proceedings). Overall, there exists a need to determine the most effective models for interaction between local people and managers. Specifically, there is a need to understand what policy mechanisms most appropriately incorporate the range of views concerning what to protect about wild places, and to develop implementation strategies that best accomplish these goals. Moreover, these considerations must be extended to marine environments.

Priority Education Issues

The knowledge gained through scientific investigation or from the documentation of local history can be useful in helping decisionmakers and community members make more informed decisions about wildlands in the Circumpolar North. In the past, we have focused a great deal of attention on the conflicts between human uses and ecological protection values. While we acknowledge that people have been living in a sustainable fashion in northern environments for a long time and wish to continue at least a partially traditional lifestyle, there is also a need to realize that there exist national and international values associated with these natural environments. The goal is to emphasize the need for finding compatibility between the array of different values associated with these wild places (Klein, this proceedings), and the challenge is to develop management plans that incorporate both acute (local) needs and more constant (regional and global) pressures, both physical and socio-cultural. Educating managers and the public about the history of these places and the many meanings people have for them provides greater insight into the effects of alternative stewardship actions. Understanding stress thresholds across multiple dimensions of discipline and scale are critical in prescribing long-term, compatible management practices.

Education needs include informing diverse and distant visitors that people do live in the circumpolar wilderness. Traditional subsistence activities have been occurring there in similar patterns for many generations and continue, at least for the foreseeable future. The Circumpolar North environment is a fragile one that will not sustain large increases in subsistence activities, although these activities are key elements of the identity of the people who live there. Residents and nonresidents alike need to understand that the Circumpolar North is not an isolated region. It is interdependent with other regions of the Earth, susceptible to external forces such as pollution, exploitation of tourism resources, and political pressures. Most of the political power of countries responsible for northern areas, however, resides in the south (Gladden, this proceedings). The education of legislators, parliamentarians, borough managers, and other political forces about the range of unique values associated with sometimes very distant, wild places is important. The incorporation of the wilderness concept into K-12 and higher education curricula will be critical in the Circumpolar North. Furthermore, our current approach of conveying arctic and subarctic systems as purely biophysical or sociocultural needs to be restructured to reflect the complex influences of diverse variables.

Currently, there is relatively little protective status extended to northern areas, although we know that there are growing threats to the relatively intact ecosystems and cultures. Education about these ecosystems and cultures will require work to maintain the presence of artifacts that will help us understand historic conditions.

We have reached a stage where the considerations mentioned above, having become complicated or exacerbated by exponential population growth, new technologies, and globalization pressures, need to enter the wilderness debate in a frank and objective manner. Without these considerations, the future of multiple uses of circumpolar natural environments is threatened.

Priority Methodological Issues

Circumpolar scientists believe that research today needs to be more pluralistic and more integrated across disciplines than in the past. In all areas of natural resource management, multiple views and “ways of knowing” must be considered. More holistic approaches to problem definition are needed and, therefore, research methodologies that extend across cultures and across the physical and social sciences are in demand. Research on the different orientations toward northern wilderness needs to concentrate more on understanding and awareness than on the expectation that there is one truth.

There appears to be growing acceptance of qualitative methods in natural resource management research, particularly with recent interest in collaborative participation in developing and implementing management plans for parks, refuges, forests, and other public lands. However, there remains a significant lack of baseline information upon which to develop and guide future research and monitoring. Qualitative research, in concert with quantitative techniques, offers a depth of understanding needed to develop testable hypotheses to test effects of management actions.

Currently, there is the perception that more effective interdisciplinary pursuits of research in the Circumpolar North is inhibited by each discipline having its own language, methodologies, and biases. While this is at least partly true, there are a growing number of native and nonnative scientists who have broad training in multiple disciplines and who are offering novel approaches to “understanding.” True understanding, it can be argued, comes about from a careful and rigorous examination of variables simultaneously (as in the “western scientific method”), as well as with an almost intuitive sense of pattern, which is obtained through generations of observation (as in the “native way of knowing” or “traditional knowledge”).

Currently, almost all research regarding natural environments focuses on tangible values that can be incorporated into tradeoff analysis. However, the concept of “tradeoffs” is too economically focused. It offers no framework outside of fiscal considerations. Cross-cultural and cross-disciplinary communication, thus, will be even more important if we are to develop frameworks that anticipate and describe diverse and multiple values, both tangible and nontangible. In large-scale assessments of wilderness values, economic values are usually overrepresented and receive too much weight. While recreational values are well articulated, local, rural, or indigenous values are not well represented, and the values associated with the size of ecological units is less often considered. New, more inclusive assessment methods must broaden to include a variety of assessment methods. Matrix frameworks are commonly being used to guide setting priorities in research, education, and strategic planning.

Limitations associated with use of quantitative methods with particular cultures are being overcome through use of semidirected interviews and other qualitative methods (Glaspell 2002; Kluwe 2002). Some of the other promising trends in social science or cross-disciplinary research methods include:

1. Efforts in the Circumpolar North to map local knowledge and values.
2. Efforts in Alaska to map critical “hotspots” where regions of high productivity converge with human activities.
3. Research projects that integrate quantitative and qualitative methods.
4. A call to challenge others to incorporate different types of knowledge into research, including traditional ecological knowledge.
5. Greater frequency of efforts to implement cross-discipline studies, for example, HARC (Human Dimensions of Arctic System Science) at www.nsf.gov/pubs/1999/nsf9961/nsf9961.htm.

To encourage these trends, circumpolar scientists suggest a continued dialogue across disciplines at workshops and seminars focused on Circumpolar North

methodological issues; expect interdisciplinary efforts to cost more time and money; encourage shared geographical study locations for integrated research; and recommend the development of performance criteria that reward interdisciplinary problem definition and product development.

Priority Infrastructure Issues

There is an historic lack of infrastructure support for accomplishment of the Circumpolar North research and education priorities listed above, and of the continued dialogue necessary to advance development of needed methodological and analytical tools. Development of opportunities for academic exchange should extend across disciplines and across cultural boundaries within the Circumpolar North.

Goals for enhancing infrastructure support should be to provide access to diverse forms of information, provide information to a wide group of stakeholders who can use it for informed discourse on wilderness issues, provide expertise to review diverse topics related specifically to wilderness issues, and bring a diverse group of interests to a common discourse in a nonadvocacy forum to exchange information and increase efficiency of decisionmaking. An initial priority is to develop within the university system of Alaska a center for exchange of information and provision of scientific and educational expertise to provide firm leadership on the priorities established above. Seeking support of interested parties, obtaining political commitment from Federal and State land stewardship agencies, and deciding on a "framework" of mission and method of operation are needed. Assembly of relevant data sets, books, articles, stewardship plans, proceedings, and knowledge about wilderness issues into one accessible collection is necessary as basic input to developing proposals to accomplish identified research and education priorities.

The founding principles of such a cooperative center should include:

1. The lands, waters, and people of the Circumpolar North are diverse and exceptional; their role in the world is significant and increasing in importance.
2. The landscapes and seascapes of the Circumpolar North are ecologically whole but fragile.
3. The lands and waters of the Circumpolar North sustain human life while providing essential spiritual values.
4. The issues and problems of the Circumpolar North require unique collaborative and creative solutions.

Proposed Values and Factors of Influence Matrix to Guide Research and Education

As a summary of knowledge gained from the papers presented at this international Circumpolar North seminar, and by using the research, education, and methodological priorities presented in this paper, a matrix can be developed that can contribute further to decisionmaking about priorities (fig. 1). This matrix currently presents 20 different values that are ascribed to Circumpolar North wilderness. Some values may be particularly important to specific cultures or stakeholder groups because certain groups may place strong weight on a specific set of these values in association with the wild character of even a single place, and may influence arguments on which areas to protect as wilderness. There is not necessarily agreement, either across the Circumpolar North countries or among stakeholder groups for a single area, about the most important values derived from protecting wilderness character, but the process of understanding the unique orientations toward the wilderness resource needs a common framework to guide discussion and knowledge building.

The columns of this matrix represent the factors that are believed to influence the realization of the values listed in the rows. Each cell of the matrix indicates an interaction between an influencing factor (sometimes a constraining influence and sometimes a contributing factor) and a specific value. Summaries of existing knowledge, or decisions about prioritization of education objectives or allocation of scarce resources for research, can be made within this framework.

The future of wilderness in the Circumpolar North rests on the successful and coordinated synthesis and implementation of these priority research and education

Wilderness values	Factors of influence (facilitating and constraining)									
	Collaborative planning and management	Scientific studies	Political conflict	Nature tourism	North-South regionalism	Appreciation of "other" orientations	Globalization	Energy exploration and development	Heavy industry development	Fragmentation of ecosystems
Watershed protection										
Cultural identity										
Spiritual inspiration										
Education										
Economic well-being										
Natural biological diversity										
Scientific studies										
Protection of rare objects										
Protection of continuous or large areas and populations										
Protection of objects of epistemological significance										
Pristine (lack of human impact)										
Protection of objects of international significance										
Geological diversity										
Scenic diversity										
Lack of technological advantage										
Sustainable lifestyles										
Traditional ecological knowledge										
Aesthetic/experiential/recreational										
Wildlife viewing										
Harvesting for sport										

Figure 1A—Values and influencing factors associated with Circumpolar North wilderness.

Wilderness values	Factors of influence (facilitating and constraining)						
	Traditional/historical uses	Commercialization and ecotourism	Funding and technical support	Leadership in communities	Fragility of ecosystems	Poor recovery from human disturbance	Poaching and other illegal violations
Watershed protection							
Cultural identity							
Spiritual inspiration							
Education							
Economic well-being							
Natural biological diversity							
Scientific studies							
Protection of rare objects							
Protection of continuous or large areas and populations							
Protection of objects of epistemological significance							
Pristine (lack of human impact)							
Protection of objects of international significance							
Geological diversity							
Scenic diversity							
Lack of technological advantage							
Sustainable lifestyles							
Traditional ecological knowledge							
Aesthetic/experiential/recreational							
Wildlife viewing							
Harvesting for sport							

Figure 1B—Values and influencing factors associated with Circumpolar North wilderness.

issues. The establishment of a Center for Wild Lands and Waters at the University of Alaska will facilitate focused and objective approaches to understanding, managing, and utilizing wilderness for the diverse communities who value it. As global pressures are exerted on wilderness areas throughout the Circumpolar North, our careful consideration of the diverse relationships humans have with it becomes especially critical. Failure to provide coordinated and effective management will impact not only the sociocultural elements that interact with wilderness but also the fundamental biophysical systems upon which life on earth depends.

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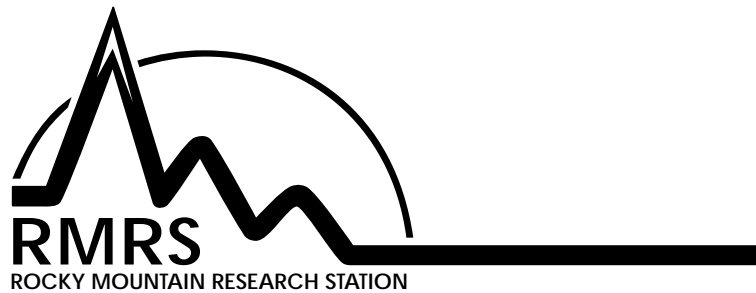
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