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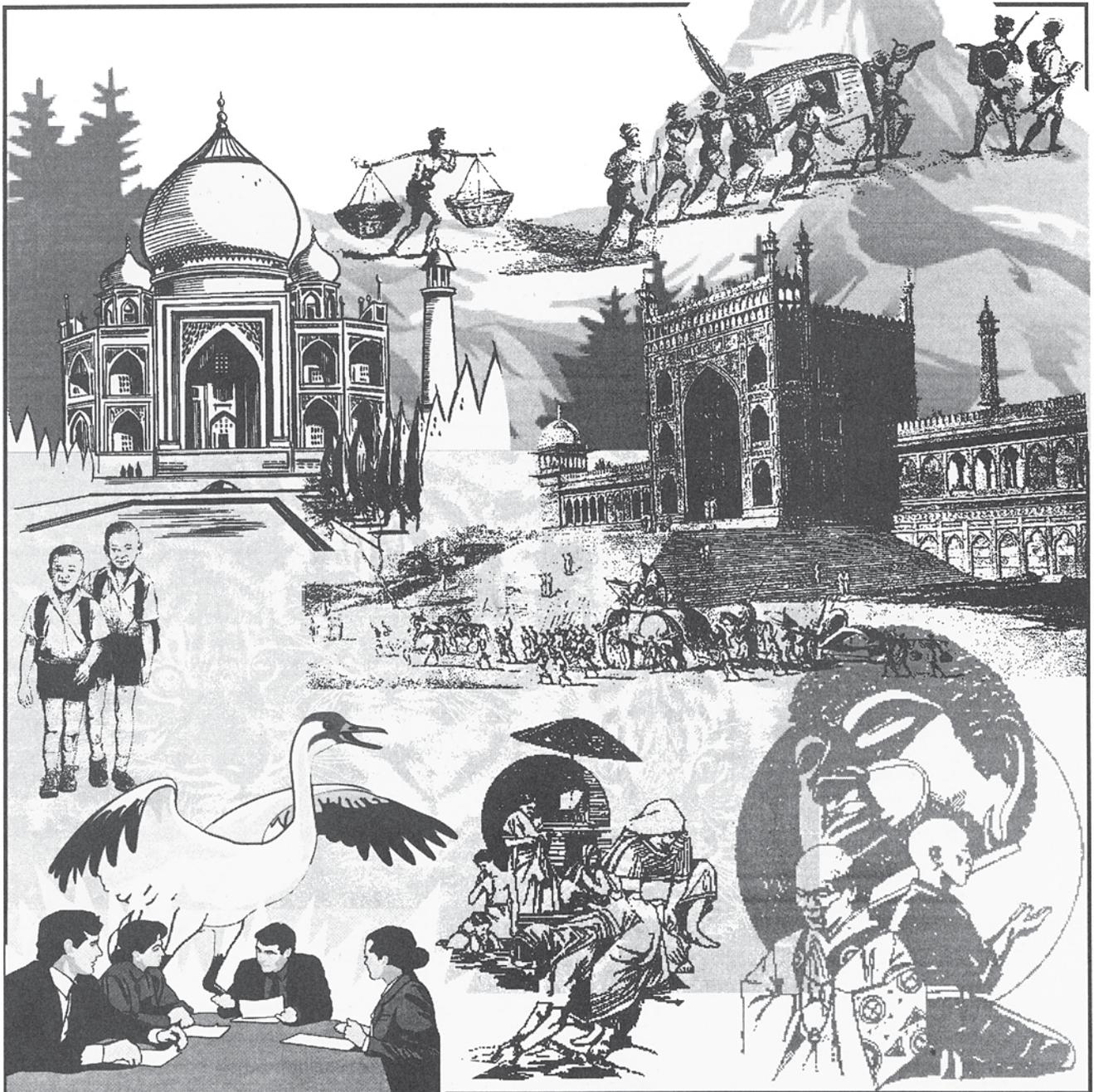
Rocky Mountain  
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# Personal, Societal, and Ecological Values of Wilderness: Sixth World Wilderness Congress Proceedings on Research, Management, and Allocation, Volume I



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## Abstract

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The papers contained in Volume I of these Proceedings were originally scheduled for presentation at the Sixth World Wilderness Congress in Bangalore, India, in 1997. Due to a delay of the Congress until 1998, these 27 papers were compiled for publication prior to presentation. Volumes I and II contain papers covering seven topics: protected area systems: challenges, solutions, and changes; opportunities and challenges of wilderness as a basis for sustainable development; understanding and protecting biodiversity; human values and meanings of wilderness; wilderness for personal growth; understanding threats and services related to wilderness resources; and the future of wilderness: challenges of planning, management, training, and research.

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Keywords: biodiversity, protected areas, tourism, economics, recreation, wildlife

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## Preface

The World Wilderness Congress first met in South Africa in 1977, followed by meetings in Australia (1980), Scotland (1983), United States of America (1987), and Norway (1993). The Sixth World Wilderness Congress, originally scheduled for October 1997, in Bangalore, India, was postponed until 1998 due to political considerations within India during the preceding summer. While there was tremendous disappointment felt by all who had planned on attending, the information to be presented there was still very much in demand. For that reason, this "Volume I" proceedings includes some of the papers planned for presentation in the symposium entitled "Personal, Societal, and Ecological Values of Wilderness: Sixth World Wilderness Congress Symposium on Research, Management, and Allocation."

Most of these papers will be presented at the rescheduled Congress, October 24-29, 1998, in Bangalore. Some 50 additional papers will be presented on far ranging topics from scientists, managers, planners, academics, nongovernmental and membership association executives, and individuals from every continent of the world. And, at least 25 poster presentations are also

scheduled for presentation to this audience. Many of these presentations (both oral and poster) will be included in the second volume of this proceedings, to be published in 1999. All of these papers expand international understanding and knowledge about public attitudes, programs, and needs for protected area systems. We hope that the knowledge compiled here emits a challenge to the world's population to take action to adequately protect the Earth's precious remnants of naturalness.

The Aldo Leopold Wilderness Research Institute, The Wilderness Society, the University of Idaho, and the WILD Foundation are proud to cooperate in compiling and distributing these two volumes of papers. We thank the USDA Forest Service, Rocky Mountain Research Station Publishing Services Staff for an outstanding job of editing and publishing this proceedings.

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**Bangalore, India, October 1997**

## **Compilers:**

**Alan E. Watson  
Gregory H. Aplet  
John C. Hendee**



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and Research**



# I. Protected Area Systems: Challenges, Solutions, and Changes





# Implementing an Environmental Management Regime in Antarctica

Paul R. Dingwall

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**Abstract**—Declared a natural reserve under the 1991 Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol), Antarctica is the largest wilderness on earth. The Protocol sets out principles for environmental protection and establishes mandatory rules for environmental impact assessment, conservation of wildlife, waste disposal and management, prevention of marine pollution, and establishment and management of a protected areas system. Further measures in respect of liability for environmental damage and response action are currently under negotiation. New institutional mechanisms for environmental management are also established under the Protocol. Due to enter into force in January 1998, the Protocol constitutes a revolutionary reform of environmental measures in Antarctica, and the first attempt anywhere to provide an environmental management regime covering an entire continent. An explanation of the provisions of the Protocol is given, and some of the actions taken to date by Treaty nations to implement the Protocol are described. The case of New Zealand legislation and policy for regulating Antarctic visitors is outlined by way of an example. The paper also identifies some recent initiatives in state of the environment reporting and environmental monitoring under the Protocol, and highlights some perceived deficiencies that remain to be overcome to allow full and practical implementation of the Protocol.

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When, in the late 18th Century, the famous British navigator and explorer Captain James Cook made the first human contact with Antarctica, he found the region so barren and inhospitable that he declared it to be “not worth the discovering.” Today, however, we have a vastly different view of Antarctica. The huge ice-bound continent and its stormy encircling seas are now recognized as exerting such an influence on the survival of humanity that wise stewardship of the region is clearly in the global interest. However, there is clear and mounting evidence that the Antarctic environment is being detrimentally affected by multisource pollution from industrialized parts of the world. At the same time, an increasingly environmentally aware and resource-hungry global society is taking greater interest in the Antarctic region and its resources. Although demilitarization and scientific endeavor were the paramount concerns of the states that drew up the treaty providing for international governance of Antarctica, these have now

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In: Watson, Alan E.; Aplet, Greg H.; Hende, John C., comps. 1998. Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management, and allocation, volume I; 1997 October; Bangalore, India. Proc. RMRS-P-4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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been joined by environmental protection as a core consideration for management of the region. This paper describes the recent introduction of the revolutionary new environmental management regime applying to the conduct of all human activity in Antarctica, and identifies the challenges facing its implementation.

## Antarctic Wilderness Values

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Antarctica is the largest wilderness on earth (Bonner and Walton 1985). Equivalent in area to the United States of America and Mexico combined, the continent expands to more than twice its size during the winter as the surrounding sea ices over. The ancient rocks of the continent, at the heart of the ancient supercontinent of Gondwana, are a key to unlocking the world's geological history, and the enveloping ice sheet, averaging 2,000 m in thickness, offers a window for observing changes in global climate over tens of thousands of years. The Antarctic ice sheet is also the storehouse for some 90 percent of the world's freshwater resource, containing enough water to raise the global sea level by 60 m if all the ice were to melt.

Ironically, the continent is almost devoid of terrestrial life. Ice covers virtually everything, and the few scattered patches of ice-free ground, encompassing less than 1 percent of the entire landmass, are extremely impoverished. Vegetation cover is very restricted and limited to primitive plant forms—lichens, mosses, liverworts, and algae—with only two kinds of higher plants able to survive, one a small grass, the other a low-growing cushion plant. The largest land animals are two kinds of wingless midges, and the stony soils harbor only small nematode worms and various springtail insects. In the freshwater lakes and intermittently flowing streams, life is confined to tiny shrimps and other small aquatic animals.

In contrast to the barrenness of the land, life in the Antarctic seas is found in abundance. At the base of the massive web of marine life are huge quantities of plankton, which in turn sustain fish, squid, seabirds, seals and whales. About half of the biomass of animal plankton is krill (*Euphasia superba*), a small crustacean occurring as vast swarms in surface waters. Krill is the staple food of the great whales and also sustains the multitudes of the six species of Antarctic seals—the most numerous of which is the crabeater seal (*Lobodon carcinophagus*) with a population of around 20 million. The seabirds are almost countless in number. There are an estimated 10 million breeding pairs among the seven species of penguins, and the population of albatrosses and petrels may total in excess of 100 million pairs.

Antarctica and its surrounding seas exert a remarkable influence on human life on earth through their regulating effect on the atmosphere and oceans of the world. The

Antarctic ice sheet produces huge quantities of cold air, which undergoes a complex process of exchange with the Southern Ocean. Such large-scale exchanges of mass and energy have a profound influence on the dynamics of global climate and weather systems, and on ocean circulation patterns. In these ways Antarctica is a uniquely significant controlling force on the stability of the biosphere.

## Human Interest and Impact in Antarctica

James Cook's pessimistic view of the future of human endeavor in Antarctica was tempered by his report of teeming seal life at the islands of South Georgia, and it was the sealers who, in the 1820's, first made an imprint on the Antarctic region, followed closely by the whalers. In just a few decades, Antarctica fur seals were brought to the brink of extinction, and the onset of whaling this century witnessed exhaustion of the stocks of the great whales, one species after another. Although whales are now protected by a moratorium on commercial harvesting and by a hemisphere-wide sanctuary under international law, the recovery of whale populations may never be complete. In contrast, with the cessation of the sealing industry, Antarctica's fur seal populations have rebounded spectacularly to at least their preexploitation levels. Interest in Antarctic marine resources in more recent decades has focused on fish stocks. From the late 1960's, new commercial fisheries commenced in the Southern Ocean for the massive swarms of krill and for rock cod and ice fish. All these largely unregulated fisheries experienced the familiar pattern of short-term, episodic "boom-and-bust," which proved neither economically nor ecologically sustainable. In recent years, the new fisheries target has become the highly valuable Patagonian toothfish, and already there is mounting evidence of excessive harvesting.

Traditionally, Antarctica has been the realm of the scientist. Scientific explorers opened up the continent during the so-called "heroic era" in the early years of the 20th Century, but it was the 1957-1958 International Geophysical Year that introduced the modern era of Antarctic science. A total of some 4,000 scientists and support staff work in Antarctica each year. Steadily expanding national research programs have witnessed the establishment of more than 40 scientific stations, many concentrated in the Antarctic Peninsula (south of South America) and most on the coastal fringe. Several are within the continental interior, and one established by the United States is at the South Pole. Establishing scientific stations has involved the construction of buildings, airstrips, pipelines, and other facilities, and there has been increasing ship and air traffic, with attendant localized disturbance of vegetation and soils, garbage disposal, and pollution of waters from disposal of wastes and fuels.

The most modern group of Antarctic visitors are the tourists. From tentative beginnings about 30 years ago, tourism has burgeoned, especially over the past decade, into the fastest growing commercial development in Antarctica. In the 1997-1998 austral summer, approximately 11,000 tourists will visit Antarctica, with numbers predicted to grow to around 15,000 by the turn of the century (Cessford 1997; IAATO 1997). Some 95 percent of tourists come by sea

aboard cruise liners, most carrying 100 to 150 passengers, with occasional visits by large cruise ships carrying 400 to 500 passengers, and other ecotours by smaller (30 pax) vessels, which often visit subantarctic islands also (Dingwall and Cessford 1996). Currently, there are about 120 cruise visits annually, mostly to the Antarctic Peninsula from ports in southern South America. Others are from New Zealand and Australian ports to the Ross Sea Region. A typical cruise is of 2 weeks duration with 5 days of brief visits ashore by inflatable craft, primarily at seal and penguin colonies, historic sites, and scientific stations. Cruises are self-contained without the support of land-based facilities and, to date, the environmental impacts have been minimal. The greatest disruption has been to the operation of scientific stations, with isolated incidences of "overcrowding." On rare occasions, groundings of vessels in uncharted waters has required search-and-rescue operations and has incurred localized pollution from oil spills. The crash of a wide-bodied commercial jet airliner at Mount Erebus on Ross Island during a tourist overflight in 1979 caused major disruption to scientific activities and the cessation of such scenic air operations until they recently recommenced from Australia, carrying about 4,000 passengers annually. Small numbers of Antarctic adventurers travel on commercial airborne expeditions from South America, with some tours extending as far as the South Pole.

Despite the current and predicted low levels of Antarctic tourist activities and their largely unsullied environmental record, there is growing concern about the cumulative impact of tourist and scientific activity and ship congestion around scientific stations, and about the concentration of tourist visits at a relatively small number of preferred destinations (de Poorter and Dalziell 1997). Of particular concern are damage to historic sites and disturbance of wildlife colonies where visits often coincide with critical times in the breeding cycle of seals and seabirds. There is also some mounting pressure for the development of accommodations and other infrastructure such as wharves and airfields—all of which would cause some environmental disturbance.

Apart from the localized and direct impacts of human activity in Antarctica, there are added indirect impacts from pollutants such as DDT and polychlorinated biphenyls (PCBs), originating from distant industrialized areas of the world. Even more concerning is the recognition that multi-source global pollution from chlorofluorocarbons and other chemicals causes serious depletion of stratospheric ozone over Antarctica, and the impact of "greenhouse" gases on global warming may be causing significantly greater melting of Antarctic ice shelves and glaciers (Walton 1997).

When taken together, the growing interest and activity in Antarctica, with attendant pressures on the environment and increased risk of undesirable disruption and damage, make a case for urgent action to ensure that the wilderness qualities of the Antarctic region are not compromised by further uncontrolled human exploitation. The world's leading conservation organization, IUCN, has documented a comprehensive case for management of Antarctica and its resources according to sound conservation principles (IUCN 1991). The Antarctic nations, too, have begun a comprehensive response to the challenge, as is explained in the following sections.

# Conservation Management in Antarctica

## The Antarctic Treaty System

The Antarctic Treaty entered into force almost 40 years ago as a unique international agreement among 12 nations who pledged to maintain Antarctica as a realm of peaceful scientific cooperation. Today, Antarctica remains the only substantial region on earth, apart from the high seas, governed under international law. The number of Treaty states has grown to include 26 Consultative Parties (those who have research programs in Antarctica and full decisionmaking powers under the Treaty), together with 17 Nonconsultative (or acceding) Parties. The Treaty Parties meet annually and make decisions by consensus, which are expressed as resolutions (formerly recommendations). Treaty resolutions are normally hortatory, and require enactment in domestic law to make them binding on citizens of the Treaty nations.

The Treaty, which accommodates without prejudice the political positions of the seven countries (Argentina, Australia, Chile, France, New Zealand, Norway and the United Kingdom) claiming sovereignty over parts of the continent, is a whole complex of arrangements reflecting a differentiated approach to the regulation of interests and activities. Thus, while the Treaty covers all land and sea poleward of latitude 60° S, the legal system is extended north into the Southern Ocean by the 1980 Convention for the Conservation of Marine Living Resources. Invoked to regulate sustainable fisheries in Antarctic waters, Convention for the Conservation of Marine Living Resources is bounded by the Antarctic Convergence—a natural boundary between Antarctic and temperate oceanic realms—and establishes an ecosystem-based conservation regime for resource management. Similarly, the 1972 Convention for the Conservation of Antarctic Seals provides regulations for management of commercial sealing, should such activities ever resume.

The Antarctic Treaty Parties are advised by the Scientific Committee on Antarctic Research established as an international body of expert Antarctic scientists in 1958. Cooperative action and information exchange among national Antarctic research programs are promoted by the Council of National Antarctic Programme Managers, which draws together managers of government Antarctic programs.

## The Madrid Protocol

In 1991, coincidentally with the 30th anniversary of the Antarctic Treaty, the governing states of Antarctica elevated protection of the environment to a new, significantly higher level. In signing the Protocol on Environmental Protection to the Antarctic Treaty (Madrid Protocol), the Treaty parties declared Antarctica to be “a natural reserve devoted to peace and science,” and committed themselves to the “...protection of the Antarctic environment and its dependent and associated ecosystems, and the intrinsic value of Antarctica, including its wilderness and aesthetic values....”

The Protocol was negotiated in the wake of a failure to agree on rules governing the regulation of Antarctic mining and mineral resource activities. Its wide-ranging provisions assemble and revise all existing environmental regulations under the Treaty, and establish new rules applying to all human activities in the Antarctic (Watts 1992). The body of the Protocol establishes the fundamental environmental principles; imposes a ban on mining in the Antarctic for 50 years; promotes cooperative planning and conduct of activities in the Treaty Area; establishes an institutional framework for implementing the Protocol; and specifies the legal obligations on the Parties in respect of compliance, inspection, reporting and dispute settlement, among others. Specific environmental rules are set out in a series of five technical annexes, dealing in turn with environmental impact assessment, conservation of flora and fauna, waste disposal, prevention of marine pollution, and area protection and management.

**Environmental Impact Assessment**—All activities are subject to environmental impact assessment procedures, though differing restrictions apply depending on whether a proposed activity is assessed as having less than or more than a minor or transitory impact. Activities with lesser impacts are subject to an Initial Environmental Evaluation only, while those of greater potential impact undergo a Comprehensive Environmental Evaluation which includes public notification, consultation among all Consultative Parties, and final approval at an Antarctic Treaty Consultative Meeting. Once an approved activity has begun, monitoring and reporting procedures must be set in place to determine whether an activity is being conducted in accordance with the Comprehensive Environmental Evaluation and the principles of the Protocol.

**Conservation of Flora and Fauna**—Rules established for conservation of native flora and fauna require that permits be obtained to authorize scientific collections, sampling, and any research activity that might cause harmful interference to plants and animals and their habitats. There are special provisions governing interference with a listed group of Specially Protected Species, and strict rules for avoiding the introduction to Antarctica of nonnative species, parasites, and diseases. Controversially, this included a requirement for the removal by 1994 of all dogs from Antarctica, including the huskies traditionally used to pull the sleds of field expeditions.

**Waste Disposal**—The Protocol requires that the amount of waste produced, or disposed of, in the Antarctic be reduced as far as is practicable. Past and present waste disposal sites, including abandoned work sites, are to be cleaned up. Some materials, such as polychlorinated biphenyls (PCBs), nonsterile soil, polystyrene beads used in packaging, and pesticides (except for approved scientific or hygienic purposes) are prohibited in Antarctica, while others have to be removed, including radioactive materials, electrical batteries, excess liquid and solid fuels and containers, rubber, lubricating oils, and plastics. Burnable wastes not removed have to be incinerated in ways that reduce harmful emissions, and open burning of rubbish is to be completely phased out by the 1998-1999 season. Sewage and domestic liquid wastes must not be disposed of on sea ice or ice shelves, but

may be discharged directly into the sea where conditions exist for rapid dispersal. Waste management plans, supervised by a designated officer, are required for all scientific stations and work sites.

**Marine Pollution**—Rules for preventing marine pollution are intended to reduce the impacts of ship operations on marine and littoral ecosystems by prohibiting discharges of oil, noxious substances, plastics, and all other garbage. It is also forbidden to discharge untreated sewage or food wastes (which must be passed through a grinder) into the sea within 12 nautical miles of the land or ice shelves—although small vessels such as yachts are exempted.

**Area Protection and Management**—Ordinary rules of ownership of territory do not apply in Antarctica. However, special protection and management provisions are required for areas acknowledged as having significant natural, scientific, historic, or landscape values, or for areas where multiple uses might cause undesirable environmental impact or give rise to disruption between conflicting activities. Thus, the Protocol provides for designation of Antarctic Specially Protected Areas to protect unique terrestrial or marine ecosystems, key wildlife breeding sites, and important historic sites such as huts from the heroic era of exploration. Management plans are required for Antarctic Specially Protected Areas, which may restrict access or the types of activities conducted, and entrance permits are required. Similarly, Antarctic Specially Managed Areas may be designated where additional planning and coordinated management of activities are required. Typical examples include areas where scientific stations, historic sites, research areas, and popular tourist landing destinations coincide, and where there are risks from mutual interference or cumulative environmental impacts. Management plans are also required for Antarctic Specially Managed Areas, but entry is not controlled by permit. Already considerable progress has been made in systematically reviewing and redesignating as Antarctic Specially Protected Areas the 55 existing protected areas; and more than 70 historic sites, and several areas such as Ross Island in the Ross Sea Region, are proposed for designation as Antarctic Specially Managed Areas.

**Regulation of Antarctic Tourism**—There has been some criticism of the Protocol for not making specific reference to tourism, and some have called for the drafting of an additional annex to cover the regulation of tourist activities (Enzenbacher 1995). However, the Protocol's provisions apply equally to tourists and tour operators as well as to all other visitors and their activities. In domestic legislation enacted to ratify the Protocol, some countries have made policy and operational provisions for tourism regulation. New Zealand's legislation, the Antarctica (Environmental Protection) Act 1994, is used here to illustrate the approach some countries are taking (Dingwall in press).

New Zealand has produced a set of guidelines and procedures to clarify the obligations for visitor activity under the Protocol and New Zealand law (Ministry of Foreign Affairs and Trade 1997). These include details of requirements for prior notification of activities, the application of an Environmental Impact Assessment process, the appointment and roles of national government representatives, the procedures for visits to scientific stations and other restricted sites, the conditions relating to protected areas (including historic huts), and safety considerations.

The Act provides for the Minister of Foreign Affairs and Trade to approve all activities in the Ross Dependency (New Zealand's claim area). Those intending to undertake activities are required to provide information to the Minister sufficiently in advance of an activity commencing, and in sufficient detail to allow informed judgement about the possible impacts on the environment. In the case of tourists, notification is made by the organizer of an expedition on behalf of the tour group. Most tourist visits are subject only to an Initial Environmental Evaluation, and the information required is to address:

- The expedition organizer and vessel(s)
- The proposed activity—purpose, location, duration (itinerary)
- The expected impacts, including those of ship and helicopter operations and passenger activities ashore
- The possible cumulative impacts of activities
- Any possible alternatives and changes to activities

By agreement between New Zealand authorities and tour operators, all commercial tours intending to make landings in the Ross Dependency are required to be accompanied by an official representative of the New Zealand government. Their role is to observe and report on compliance with any requirements under official policies and approvals for visits, any management plans, any plant or animal quarantine regulations, any ministerial direction in respect of the Environmental Impact Assessment, and to assist in supervision of visits to scientific stations and historic sites.

The guidelines provide details on prohibited or restricted access to Specially Protected Areas, and outline the procedures for obtaining permits to cover any activity related to fauna and flora. Legally binding management plans are available or in preparation for all Specially Protected Areas in the Ross Dependency.

Safety of operations is a matter of particular concern covered in the guidelines. The issues that tour operators are required to consider are:

- Small boat operations, including provision of survival equipment aboard boats and during visits ashore
- Helicopter operations, including supervision of behavior in and around aircraft, provision of survival equipment, and availability of back-up aircraft in the case of accident or emergency
- Personal clothing, including the need for adequate clothing to meet all likely encountered conditions
- Training of tour staff, including handling of craft, emergencies, survival techniques, first aid, snowcraft, and risk management

## Future Requirements for Environmental Management

The Madrid Protocol establishes an environmental management regime that is as sophisticated as any comparable regime in any other major region of the world. But it is not yet complete, and making it a reality in practice remains a considerable challenge.

Following ratification by the last of the signatory parties, the Protocol is scheduled to enter into force in January 1998,

almost 7 years after its adoption. Thus, the work done to date in implementing the Protocol has been undertaken on a voluntary basis by the Treaty countries. A Transitional Environmental Working Group has conducted the work to be done eventually by the principal institution created under the Protocol—the Committee for Environmental Protection, which will be formally convened for the first time at the next Treaty meeting in May 1998. This Committee, representative of all Protocol parties, is charged with providing advice to the Antarctic Treaty Consultative Meetings on implementation of the Protocol. It is to provide advice on, among others, application of environmental impact procedures, operation and elaboration of the protected area system, inspection and reporting procedures, collection and exchange of information, and the need for scientific research and monitoring. The Committee is encouraged to consult as appropriate with the Scientific Committee on Antarctic Research and the Scientific Committee of the Convention for the Conservation of Marine Living Resources, the heads of which are invited observers at meetings of the Committee for Environmental Protection. Other relevant scientific, environmental and technical organizations, such as the United Nations Environment Program and the World Conservation Union (IUCN), may also be invited to participate as observers at meetings of the Committee for Environmental Protection.

Issues of compliance also remain incomplete. In particular, the rules and procedures to address liability for environmental damage and remedial response action have yet to be decided. Several meetings of a group of experts of the Treaty Parties have worked on the development of an Annex on Liability for the Protocol, a major area of unfinished business of the Protocol regime. An agreement on rules governing this complex, but vital, policy element of the regime remains elusive.

There also remains some questions about the adequacy of the coverage of the Protocol. For example, the Protocol doesn't apply to activities carried out under other legal instruments of the Antarctic Treaty System, such as Conservation of Antarctic Seals and Convention for the Conservation of Marine Living Resources, which govern sealing and fishing activities, respectively. Moreover, jurisdiction under the Protocol is confined to the Antarctic Treaty Area, bounded by 60 degrees south latitude. But this area doesn't entirely encompass the natural feeding range of important Antarctic wildlife species, such as petrels and penguins. Given the Protocol's aim to protect the totality of the Antarctic environment, including its dependent and associated ecosystems, there is a strong argument for extending the boundary of the Protocol at least as far north into the Southern Ocean as the Antarctic Convergence—the natural outer limit of the Antarctic marine realm at 45 to 55 degrees south.

Nor is it clear whether the Protocol applies in the case of the sea floor, or whether jurisdiction of the seabed is confined to the International Seabed Authority under the United Nations Law of the Sea Convention. In a worst-case scenario, deep seabed mining for oil or other resources might be able to proceed legally in Antarctica despite the Protocol's ban on mining.

While there are several issues yet to be resolved before the Protocol is firmly established in law and practice, some very real progress has been made and there are several useful initiatives in train. One notable advance is the agreement by

the Treaty Parties, meeting at their latest ATCM in Christchurch, New Zealand, in May 1997, to prepare a State of the Environment Report for Antarctica. This is intended to be not only a valuable benchmark against which to monitor environmental change and measure human-induced impacts, but also to provide a valuable synthesis of the large volume of accumulated scientific knowledge about Antarctica.

The Parties have determined to make progress on clarifying the objectives and approach and to propose a timetable for preparing the report for discussion at their 1998 meeting in Tromsø, Norway. New Zealand has undertaken initial work to prepare, by the year 2000, a State of the Environment Report for the Ross Sea Region; other countries are considering parallel developments for areas of their respective interests in Antarctica. The Parties have also endorsed the need for a technical handbook of standardized environmental monitoring techniques, a complementary environmental data management process, and improved coordination of monitoring activities.

These developments signify a renewed recognition by the Treaty nations of the global significance of Antarctica, and of their commitment to environmental protection and sustainable use of its resources. The real test, however, still lies ahead. In the face of an ever-increasing human presence in Antarctica, and mounting pressure for use of its resources, can Antarctica remain wild and beautiful, with its biota and landscapes intact? Can Antarctica be brought into a new era of resource management without compromising its wilderness values? The recent developments consequent upon the establishment of the Madrid Protocol allow us some confidence in arriving at an affirmative answer.

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# Regional Features of the System of Specially Protected Areas in the Sakha Republic (Yakutia)

N. G. Solomonov

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**Abstract**—The network of specially protected areas in the Sakha Republic (Yakutia) in 1993 included two reserves and 18 zakazniks totaling nearly 10.3 million ha. Following a resolution by President M. Nikolayev, work on the arrangement of the specially protected areas system accelerated, and at present, Sakha has two reserves, 44 resource rezervats, four national nature parks, 26 protected landscapes, 41 reserve lands, and a number of nature monuments. They embrace over 14 percent of the Republic's area. Even now, we may see the outlines of a specially protected areas system that is well underway. It will consist of seven subsystems and should result in the conservation of biological diversity and the environment of plant and animals. This paper describes the Prilena subsystem as an example.

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Through the efforts of several generations of scientists and conservationists, Russia established a unique network of reserves and protected areas called zakazniks (Shtilmark 1984). The purposes of these reserves are to preserve and increase the populations of some rare and endangered animal and plant species and to preserve the unique landscapes and ecosystem types in all regions of the country. But this network is not distributed uniformly. Until recently, some regions, including the Far North and North East Russia, had a limited number of specially protected areas. In the north of Siberia and the Far East, reserves were established only after the mid 1970's (Syroyechkovsky and Shtilmark 1983). These are the Malaya Sosva, Yugansky, Bolshoi Taimyr, Central-Siberian, Olekminsky, Lena Delta, Wrangel Island, and Magadansky reserves. During this time, many zakazniks, protected landscape sites, and monuments of nature were established in the Russian north. The first national parks also appeared. Despite this, the northeast of the country and the Sakha Republic (Yakutia) remained a region with an insufficient number of specially protected areas until the mid 1990's.

## A Protected Area System in Sakha

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Sakha occupies a vast territory covering 3.1 million km<sup>2</sup>, with different landscapes distributed within its borders.

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The Arctic desert areas of the Arctic Ocean islands, endless tundra, northern taiga, great mountain systems, and steppe sites all occur in Yakutia. It is a land of powerful rivers and many lakes; it is the country of continuous permafrost. Environmental diversity results in a relative richness of plant and animal species, and an abundance of endemic species. Yakutia possesses valuable mineral treasures—diamonds, gold, tin, mica, oil, and gas. In past decades, it supplied industry with raw mineral material, and destructive, exhaustive nature use and management resulted in adverse environmental change.

In response to these conditions, President Mikhail Nikolayev (Sakha) initiated a state ecological policy for the Sakha Republic (Yakutia) (Alexeyev 1996; Nikolayev 1996). One of the most significant results of the policy is establishment of a system of specially protected areas.

(For many years, the author of this paper was engaged in the problems surrounding the development of a network of specially protected sites. In 1986, the Proposal for the Russian Soviet Federative Socialist Republic GosPlan, "General Outline for the Establishment of Specially Protected Territories in the YASSR," was prepared in collaboration with V. I. Perfileyev. In 1990, the manuscript "The System of Specially Protected Territories in the YASSR" was prepared for the YASSR GosPlan and with the participation of V. I. Perfilev and A. L. Popov. Later, the SR(Ya) Ministry of Nature Protection commissioned a scientific report, "The Development of the System of Specially Protected Areas in the Sakha Republic (Yakutia) for the Nearest and Far Challenge," written with N. I. Germogenov in 1993.)

By January 1, 1993, two reserves with a total area of 2,280,000 ha and 18 zakazniks occupying 8,760,000 ha were established in the Republic. These specially protected areas were not sufficient to solve the environmental problems related to biodiversity preservation and the conservation of both human and animal habitats. Therefore, the SR(Ya) Ministry of Nature Protection, through its regional branches and the collaboration of scientists and the ecological community, prepared a list of specific sites proposed for protection.

A new phase of establishment of protected areas has begun since Resolution No. 837 of the Sakha President, "The Action on the Development of Specially Protected Areas," was issued on August 16, 1994. On the same day, President M. E. Nikolayev signed a second resolution, "On Institution of Particular Regime for Use and Conservation of Unique Lakes in the Sakha Republic (Yakutia)," that ensured special protection for 25 important lakes.

Some time later, the Sakha government approved "The Statement on Reserved Areas in the Sakha Republic (Yakutia)." Finally, in 1996, the Sakha State Assembly

(called Il Tumen) adopted the law related to specially protected areas. These legislative acts determined the main types of protected territories and the course of development of the specially protected areas system in the Republic. Recognizing the enormous ecological challenges of the world, the government intends that the specially protected areas conserve not only rare and disappearing species, ecosystem types, unique landscapes, and natural monuments, but also the conservation of an environment where plants, animals, and man himself can live. That is why President Nikolayev and the Sakha government consider it necessary to put 20 percent of the Republic's lands (600,000 km<sup>2</sup>) under strict control as protected areas by the year 2000. The specially protected areas system, if expediently designated, may create the basis for a future system of specially protected territories, providing efficient conservation of plant and animal habitats, preservation of biological diversity, maintenance of ecological balance, and stable development of the human community (Solomonov and Germogenov 1994).

Given the widespread extent of the specially protected areas network, it is only natural that the system permit some human activity. The Sakha Republic (Yakutia), based on the federal law governing specially protected areas, also has established reserves that totally exclude any human economic activity, its own regional variation of specially protected areas management (Alexeyev and Lazarev 1997). These correspond to categories generally accepted by the IUCN and include resource rezervats, national nature parks, protected landscapes, and nature monuments. Table 1 shows that the number of reserves will remain constant until 2000, while the other four specially protected areas types will grow. It is anticipated that both Yakut reserves—Lena Delta and Olekminsky—will soon adopt the status of biosphere reserves. Zones of strict control and of traditional nature use are expanding now, and the Lena-Delta reserve has already been enlarged. According to SR(Ya) governmental decision No. 337, released on August 12, 1996, a large Lena Delta rezervat of 5,932,000 ha should be established. The rezervat boundaries would join these of the Lena Delta State Reserve both inside and outside the limits of the river delta: in the Lena downstreams, near the foothills of the Kharaulakh mountains, and reaching the New Siberian Islands.

From 1995 to 1997, the first national parks of Yakutia—Lena Pillars, Momsky, Ust-Viluisky, and Sinyaya—were established and placed under the jurisdiction of the Republic. The SR(Ya) law promoting the conservation of natural

sites through the designation of national nature parks states the following:

National nature parks include territories and complexes particularly defended by law and customs of the local North peoples as well as typical and rare landscapes that are of ecological, educational, recreational and scientific importance; that are habitats for wild plant and animal communities; places of entertainment; places for performing ceremonies, customs and traditional religious beliefs of local North peoples; tourism; and excursions promoting the ecological education of citizens.

The four national parks of Yakutia are open to the public and are established on lands that have unique landscapes and interesting nature features distinguished by unusual beauty and esthetic or recreational value, and are attractive to the tourism industry. For example, many sites in Lena Pillars National Park contain wonderful shore rocks taking the forms of mysterious castles, minarets, and forts. There are remains of the most ancient organisms—archiocytes and trilobites, that were the residents of the Cambrian sea; Earth evolution has left its evidence for over 500 million years here. Along the river's steep banks, the relics of mammoth fauna bones—mammoths, bison, ancient horses, elk and deer—may be found. Lena Pillars National Park is the only place on Earth where a local rare plant species, *Redovskia sophiiifolia*, may be found, and there are other species of rare and disappearing plants and animals in the park. Commercial fish species, birds, and mammals are well represented here, too.

Resource rezervats have become the main form of specially protected areas in the Republic. Rezervats are set up for: (a) preservation of natural resources of the given area for future generations by preventing or impeding and scientifically regulating economic activity; (b) providing conditions necessary to conserve species populations and species groups or physical objects of nature; and (c) preservation of the environment of indigenous North peoples and maintenance of the optimal conditions for the continued development of their culture, especially their traditional types of economic activity and lifestyle.

There are closed zones of absolute rest in the national nature parks and in resource rezervats where any kind of human activity is banned. Moreover, these zones protect "sacred" places containing objects of people's cult and worship where traditional rituals are usually held.

Closed zones and sacred places are particular kinds of reserves. Other zones of restricted and recreational activity are designated in the national nature parks, too, for

**Table 1**—System of Specially Protected Areas in the Sakha Republic (Yakutia) (thousands, ha).

	Specially protected areas type											
	Reserves		Resource rezervat		National nature parks		Protected landscapes		Nature monuments		Reserve lands	
	number	total area	number	total area	number	total area	number	total area	number	total area	number	total area
1970	—	—	7	1036.6	—	—	—	—	—	—	—	—
1993	2	2280.0	18	8760.0	—	—	—	—	15	—	—	—
1997	2	7365.0	44	19652.0	4	5144.1	22	620.0	15 <sup>a</sup>	—	41	14827.2

<sup>a</sup>15 legalized by Sakha government. Proposed -152.

example, zones for keeping and breeding rare and disappearing species and protected historical and archeological zones. In the natural resource rezervats, zones for licensed harvest of biological stocks, zones of seasonal restrictions on natural resource extraction, and zones for traditional nature use are distinguished. Resource rezervats have been established in previously existing zakazniks of Russian and Republican designation, as well as in new areas.

Figure 1 illustrates the Kytalyk rezervat zoning. A considerable part of Kytalyk is given to the zone of absolute seasonal rest. In the spring-summer-autumn seasons within this area, all economic activity is prohibited. Both parts of this zone are sites of concentration and nesting of rare and disappearing birds, especially the Siberian crane (*sterkh*). Between the two parts of this zone, there is an area for restricted traditional activity—licensed wild reindeer bagging and traditional nature use. South of the Kytalyk basic part sits the “sacred land” of Berelyakh—a place of indigenous people’s worship and the mammoth “cemetery.” In the north, there is a reserve zone that comprises the nesting grounds of the spectacled eider, together with some other rare bird species in the Indigirka River delta and in the coastal tundra west and east of the Indigirka.

The RS(Ya) law on specially protected areas introduced the notion of protected landscapes:

...parts of lands and water areas to protect natural landscapes (river valleys, alasses, lakes, forest massifs, mountains) that are considered sacred by indigenous communities characterized by harmonious interaction between man and land and that may provide opportunities to serve as tourist and recreational destinations and to support regulated economic activity on their area.

Twenty-five unique lakes of Yakutia and their adjoining shore lines are now protected under this new category of specially protected areas. Unlike the other forms of specially protected areas, protected landscapes are designated without withdrawal of land, water, and other resources. Nature monuments are unique objects of nature having great ecological, scientific, historical, and cultural importance. In Yakutia, nature monuments are represented by geological, hydrological, biological, and complex objects. Of the 152 proposed nature monuments in Yakutia, 15 have been officially designated.

Figure 2 indicates specially protected areas territorial allocation by natural zone. Most specially protected area units are in mid-taiga and tundra zones. Their number is

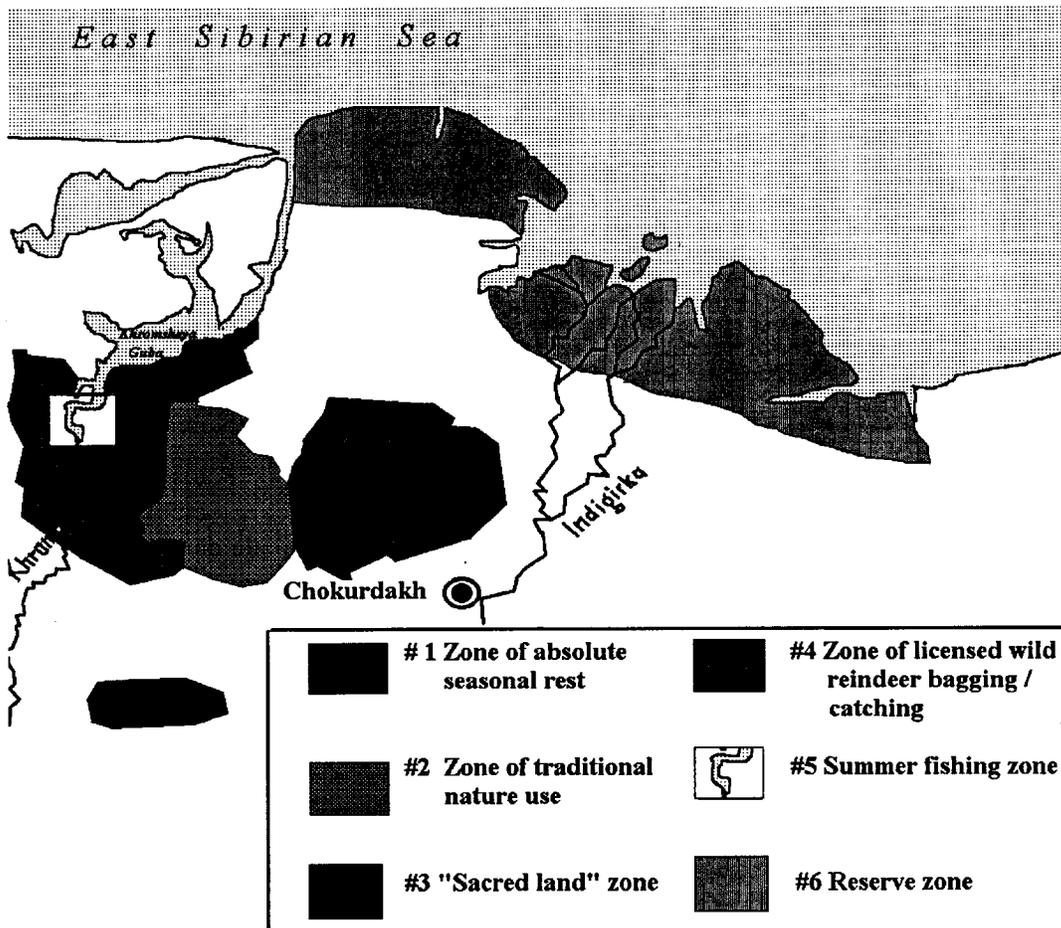


Figure 1—Kytalyk rezervat zoning.

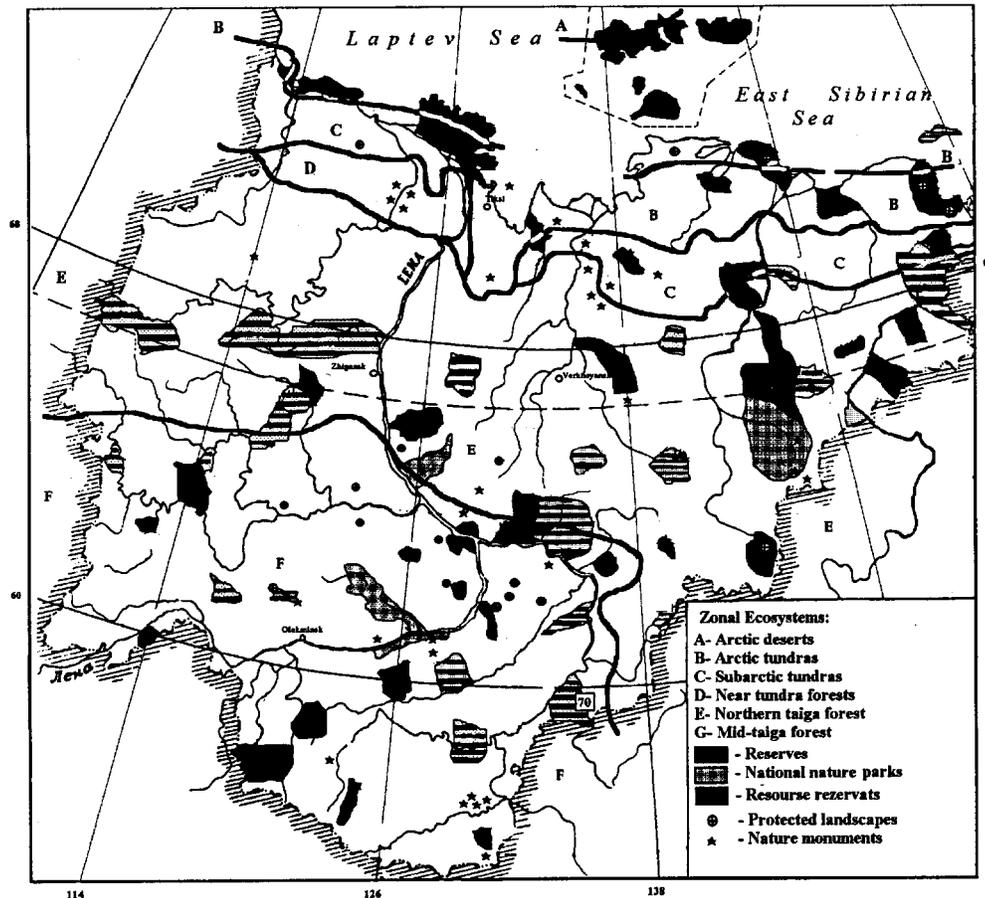


Figure 2—Specially protected areas territorial allocation by natural zone.

very small in the north taiga zone, particularly in the northwestern and Yana-Indigirka regions, as this area was mostly developed by the mining industry. By 2000, it is anticipated that new specially protected areas will be added in these regions to rectify the shortage. Toward this end, the Republic has already identified many reserve lands for future designation as resource rezervats, national parks, protected landscapes, and nature monuments.

## An Interim System

In the meantime, an interim system of specially protected areas of the Republic comprising seven subsystems will be recognized. The subsystems are: Arctic, Kolyma, Yana-Indigirka, Central-Yakutia, Prilena, West Yakutia, and South Yakutia. Each of these subsystems will encompass an independent ecological and economic region, and provide for the conservation of the environment within the region.

As an example, consider the Prilena subsystem, one of the largest. It encompasses a significant part of the Lena River basin extending from the Republic's southwestern borders along the Lena River valley to its mouth. A number of different ecosystems exist within this area: arctic and subarctic tundras, northern parts with scarce forests, north-taiga and mid-taiga forests, relic steppes, mountains of

North and South Yakutia, unique Yakut alasses (meadow depressions of thermokarst origin), and tukulans (large spots containing moving sands that look like northern cold deserts). This great river valley, with plenty of meadows and wetlands, extends through the entire region and is known as an ecological route through which many plants, animals, and their associations migrate northwards.

In the lower Lena, is Tit-Ary Island, the most northern point where larch trees grow. Over 190,000 lakes are home to 42 fish species, including unique forms of the family Salmonidae. Prilena is the flyway for many water birds during spring and autumn migration. Lakes of the Lena River valley and its neighboring Central-Yakutian lowland provide staging posts and rest areas for migrating birds, as well as nesting sites for resident species.

Sixty mammal species, or 90 percent of all Yakutian teriofauna, inhabit the Prilena. All game species also occur here. Toward the east and north is a trend of impoverishment of plant and animal species composition due to latitudinal-zonal changes in environmental conditions. It is clearly seen in plants, invertebrate animals, amphibians, and reptiles, but is less apparent in fish, birds, and mammals.

The Lena River valley and its adjoining parts are mostly mastered by man in Yakutia. Here, such towns as Yakutsk, Lensk, Olekminsk, and Pokrovsk emerged, and industrial

and rural settlements of Mokhsogollokh, Sangar, Zhigansk, Kyusyur, and Tiksi were built. The lands of the valley are used for farming. During recent decades, the area of relic steppes and floodplain spruce woods sharply decreased, meadow productivity declined by one-half to two-thirds, and the terrestrial vertebrate fauna greatly changed within the limits of the valley. During the 1940's, the first sharp ecological decline took place in the Lena River Delta: populations of valuable game fish, such as, muksun, least cisco, inconnu, Arctic cisco, were undermined. Stocks of these fish are only now recovering. This example illustrates the fact that these northern ecosystems are extremely fragile; they are easily destroyed and difficult to restore. The same is true for land ecosystems. On Tit-Ary Island also in the 1940's, workers at the fish processing plant cut the undersized larch trees, and this northernmost larch wood has still not re-established.

It is only natural that the new network of specially protected areas of the Republic should originate in Prilena. The first state reserves and zakazniks were established here. They are the Lena-Delta and Olekminsky reserves and the Ust-Viluisky, Belozersky, Khariialakh, Dzerono, Pilka fauna, and complex zakazniks. At present there are two state reserves, three national parks, and about 20 resource rezervats and protected landscapes. In addition, about 10 reserve lands are designated to become future resource rezervats and protected areas. Among them are such large areas as: Muna (approximately 1,000,000 ha), Kerikte (300,000 ha), and Khamra (270,000 ha). In the 4 years that have passed since the President's Resolution was released, the number of specially protected areas in various categories has increased three-fold. It appears that the President's will is being implemented.

The Prilena network of the specially protected areas will ensure the conservation of several tracts containing relic steppes with their peculiar flora and fauna, the improvement of flood pasture yields (thanks to the conservation and use of the most appreciable fodder grasses), the preservation of remaining spruce forests growing in the valley and the plant and animal communities associated with this type of forest, the conservation of island pine and birch forest in the Lena River basin, and the protection of wetlands that

serve as staging stops for migrating birds and reproduction sites of fish, birds, and mammals, particularly game species. The Prilena specially protected areas will be the place for recovering and raising rare and endangered species of plants, and restocking appreciable medicinal herbs. Simultaneously, the specially protected areas network will become the basis for establishing guided ecotourism and the center of ecological education and training of citizens. Thus, the specially protected areas system underway in the Prilena region will become one of the important subsystems of the general Sakha specially protected areas system, focus on ensuring biodiversity conservation, and serve as the fundament of wildlife. Other subsystem units of the general specially protected areas network in Arctic Yakutia, the Kolyma River basin, Yana-Indigirka, West Yakutian and the South Yakutian industrial regions, taken together, will contribute to the conservation of significant components of the environment in the Sakha Republic (Yakutia). This specially protected areas system joins the Russian and circumpolar planetary systems of environmental conservation while allowing for regional distinctions of nature and traditions of peoples in North East Siberia.

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# Protected Areas in Russia: Management Goals, Current Status, and Future Prospects of Russian Zapovedniki

David Ostergren  
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**Abstract**—In 1991, the Russian Federation inherited the Soviet Union's land protection system. A unique feature of the multifaceted system is the network of zapovedniki (strict nature preserves). Currently there are 95 zapovedniki set aside from economic exploitation and protecting 31,026,600 ha. The intended mission of the zapovednik system includes the conservation of biodiversity, the preservation of unique or typical natural areas for scientific research, and long-term ecological monitoring. Since the fall of the U.S.S.R., the system has experienced a 60 to 80 percent reduction in Federal funding. Limited Federal funding has placed enormous stress on administrators and directors as they strive to conduct research and protect the areas from trespass.

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In 1991, the Russian Federation inherited the Soviet Union's land protection system. A unique feature of the multifaceted system is the network of zapovedniki (strict nature preserves). In the late 1800's, men such as soil scientist V. V. Dokuchaev established research stations in the disappearing steppe of southern Russia and the Ukraine. In 1908, Moscow zoologist G. A. Kozhevnikov proposed the concept of zapovedniki at the fiftieth anniversary of the Imperial Russian Society for the Acclimatization of Animals and Plants. Zapovedniki were to be areas virtually free from any economic or human activity such as logging, mining, farming, or recreation. Conceptually, zapovedniki would act as areas for ecological research and "controls" for comparison to other land uses such as agriculture or resource extraction (Boreiko 1995; Kozhevnikov 1908; Shtil'mark 1995; Weiner 1988).

In stark contrast to the proportionately larger and publicly accessible North American wilderness areas, zapovedniki have been preservation oriented, reserved for research, and accessible almost exclusively by the scientific community. The focus on scientific research clearly distinguishes the Soviet system from those around the world. Not coincidentally, some of the most innovative ideas in ecology were originated on zapovedniki by men like V.V. Stanchinsky

(Weiner 1988). Over the last 80 years, the amount of land area protected within the system has fluctuated in response to the priorities of the central government. Nonetheless, zapovednik staff have maintained their primary missions to conduct research in pristine, natural conditions and protect typical and rare ecosystems.

Historically, Federal, regional, and local government bodies, or the Russian Academy of Science, have designated ecologically, geologically, or biologically unique or sensitive areas as zapovedniki (Pryde 1991). The first preserve, Barguzin Zapovednik, was established by a regional government in 1916 to protect the sable (*Martes zibellina*) population near Lake Baikal. Although several zapovedniki were established by local and provincial authorities, it was not until 1920 that the first Federal zapovednik—Il'menskii Zapovednik—was established. By 1933, 69 Federal and regional zapovedniki protected 6,114,568 ha of land across the Soviet Union (Shaposhnikov and Borisov 1958).

In the late 1930's, scientists throughout the zapovednik system established a set of standards for collecting botanical and zoological data. This document is the "Letopis Prirody" or Chronicles of Nature. Complementing a long tradition of ecological research, some population and meteorological data have been collected since the 1920's (Bannikov and Kozlovsky 1969; Kirikov 1962).

The guidelines for collating the Chronicles have been reviewed in 1940, 1954, 1967, and 1979 (Sokolov and Zykov 1985). The most recent guidelines provide a suggested methodology, a standardized format for publication, and requests information such as physical description of the preserve, meteorological data, research conducted by resident scientists and collaborating universities, and anthropogenic disturbances including pollution and illegal trespass or poaching (Filonov and Nykhimovskaya 1985). The document is supposed to be published annually by each zapovednik. Funding and resources have limited some of the publications, but many zapovedniki make the Chronicles of Nature a priority (Ostergren 1997).

In 1951, the 128 zapovedniki protecting approximately 12,600,000 ha came under sharp criticism from Gosplan (the central planning agency). In 1951, 88 zapovedniki were closed, and the area of protected lands was reduced to 1,384,000 ha. This is apparently because Stalin wanted to increase society's control over nature and put all lands to economic use (Boreiko 1993; Kabanov 1960; Pryde 1972). Stalin died shortly afterwards and the pressure to dismantle the zapovedniki faded away. The system began to grow again throughout the 1950's, and by 1961, 93 zapovedniki protected 6,300,000 ha (Dement'ev 1957). However, in 1962, Khrushchev launched another attack on the system in

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order to bring more land into economic production (Boreiko 1994). After this "re-organization" in 1964, 66 zapovedniki protected 4,267,400 ha of land (Zharkov 1964). Just as Stalin's death coincidentally stopped the wholesale destruction of the zapovedniki in 1952, Khrushchev was removed in 1964 and the system again began to recover.

The 1968 U.S.S.R. Land Legislation Act reaffirmed the role of zapovedniki in society, "[A]ny activity that infringes upon the natural complexes...is forbidden both on the territory of the preserves as well as within the boundaries of protected zones established around the preserves" (Pryde 1972). Despite the public affirmation of zapovedniki, new pressure surfaced in the late 1960's for increased recreational access. Limited tourist and recreational activity had traditionally been allowed on very few preserves, and the areas affected were restricted to less than 1 percent of the land. The Soviet authorities responded to the public demand for outdoor recreation by initiating a national park system in 1971 (Borisov 1971). The national parks remain distinct in that they are managed by the Federal Forest Service, encourage recreational use and conduct less research. Pressure remains on zapovedniki near population centers, but the impact has in large part been negligible.

The 1970's and 1980's were characterized by slow growth in the system throughout the Soviet Union to 178 units by 1991. When the Soviet Union collapsed, Russia had 77 zapovedniki located within its borders (Stepanitski 1997a). Despite some benefits from the fall of the Soviet Union, zapovedniki are facing serious challenges to protecting their resources and conducting research.

Two pieces of legislation are fundamental for post-Soviet management of zapovedniki. A Decree by President Boris Yeltsin on October 2, 1992, "On Special Protected Natural Areas of the Russian Federation," charged regional and local governments, land management agencies, and research institutions to develop a rational plan for a system of protected areas in Russia. A subsequent commission recommended that Russia should protect 5 percent of its total land area in zapovedniki and national parks by 2005. (Currently Russia protects 1.92 percent of its area.)

In 1995, "The Law on Specially Protected Natural Areas" was passed by the Duma and signed by President Yeltsin. This landmark legislation outlined the legal standing and goals of all types of natural areas. The goals for zapovedniki include: (1) the conservation of biodiversity, (2) the preservation of unique or typical natural areas for scientific research, and (3) long-term ecological monitoring. To a lesser degree zapovedniki (4) provide conservation training for professionals, (5) environmental education (which may include limited tourism), and (6) expertise in the environmental impact regional development projects. For the first time in history, this legislation specifically described the rights and responsibilities of zapovednik employees. This Federal legislation consolidates and legitimizes a long history of protection and research on zapovedniki located across Russia's landscape.

## Amassing Problems

Spiraling inflation and a shortage of Federal revenue cut the budget for most zapovedniki 60 to 80 percent from 1990

to 1993. The drop in Federal funding impacted every aspect of management, from research and development to salaries and purchasing basic supplies such as food and gasoline. Several issues are particularly important.

## Research

Baseline research is a primary responsibility for zapovedniki. Since 1990 there has been an overall drop in the quantity of research, especially in the remote and newer zapovedniki (Ostergren 1997). Although difficult to quantify, experts identify several obstacles: (1) The sheer size of most zapovedniki requires helicopter access, and increasing costs have all but eliminated the use of helicopters. For instance, the Sayan-Shushensky Zapovednik dropped from 150 flights per year to three or four. Katun Zapovednik was established in 1992 and has never had helicopter access. Other difficulties include (2) attrition of research scientists to other work or organizations because of a lack of pay, (3) a drop in university funding for research and internships, and (4) a lack of Federal funding to cover expenses and equipment.

As managers adjust to the new conditions of post-Soviet Russia, some zapovedniki have maintained research levels through international funding. In addition, zapovedniki near cities have experienced a surprising increase in use by research scientists. Unfortunately, many local scientists are so poor that they must take jobs with the zapovedniki to augment their income (Ostergren 1997). We would like to emphasize that the quality of research remains high, and most authorities believe the quantity will inevitably recover. Russia has a large, well educated populace, the scientific community is dedicated to its responsibilities, and national and international funding organizations are now being tapped (Ostergren 1997; Shvarts 1995).

A critical problem with research is that access to data is very restricted. One consequence of inaccessible data is that management decisions do not utilize the most recent research (such as Filonov 1989, 1993). Generally, there are only two copies of the Chronicle of Nature, one for the zapovednik and one for the Department of Zapovedniki in Moscow. After 4 or 5 years, the Chronicles are transferred to the central archives and become very difficult (sometimes impossible) to retrieve. The Chronicles themselves average 250 pages and are not convenient for processing or Xeroxing. A pressing and essential task is to transfer much of the current data (and selected long-term data for global analysis) to computer data banks. As of 1997, a national or international plan to convert the data to an electronic form was only theoretical. Although their scope may be limited in years, species, or region, some successful projects include: the book "Strict Nature Preserves of Russia. A Collection of Data from 1991-1992" published by the Biodiversity Conservation Center in English and Russian (Volkov 1996); the UNESCO Man and the Biosphere plan to standardize data for 19 zapovedniki/biosphere reserves using the United States MABFauna program; listing of select species such as the list of lichens in the Main Botanical Garden of the Russian Academy of Sciences; and a data base is being generated on mammals, birds, reptiles, and vascular plants for recent years at the Biodiversity Conservation Center (Shvarts and others 1996).

## Protection

In addition to research, a fundamental role for zapovedniki is to protect rare or typical landscapes that will eventually represent all ecosystems within Russia. Along with the landscape, the indigenous plants and animals and the corresponding ecological processes are to remain intact. Limited funding places tremendous pressure on the staff charged with protecting the perimeter of zapovedniki. Vsevolod Stepanitski is the Chair of the Department of Zapovedniki Management within the State Committee on Environmental Management. Under his direction, zapovedniki have been directed to increase the enforcement of laws and regulations articulated in zapovednik management guidelines. The 1995 Law on Specially Protected Natural Areas gives the employees the strength and legal standing to arrest and detain law breakers. Prior to 1995, local constables or militia were required to effect an arrest.

In 1995, the Department began to collect comprehensive statistics on violations for zapovedniki to understand current problems and direct limited resources. Table 1 summarizes results from the 75 zapovedniki that reported violations in 1995 and 1996. It is too early to predict trends or draw concrete conclusions.

Intense poverty and limited job prospects contribute to the pressure for locals to violate the integrity of the zapovedniki for mammal, fish, and plant products. Not only does hunger motivate trespassers but an increased monetary reward has coincided with access to international travel. Endangered animal parts for medicinal purposes or trophies such as tiger and leopard skins are very lucrative and easier to smuggle out of Russia since the fall of the Soviet Union.

Another rising problem for zapovedniki is encroachment by expanding villages or the construction of dachas (summer homes) (see table 1 and the 8 to 38 incidents of “seizure of land”). In areas with a significant population, vague rules and laws governing land ownership pose the potential to become a tremendous problem. Chairman Stepanitski also states that zapovedniki are now exercising their right to arrest and retain violators as stipulated in the 1995 Law. In 1996, 29 zapovedniki reported arresting violators and confiscating 265 firearms (Stepanitski 1997a).

As the threat of poaching increases, patrolling zapovednik borders has become more difficult, dangerous, and expensive. Helicopters are rarely used to patrol borders unless they can be utilized in conjunction with research expeditions. Some preserves have armed and trained inspectors specifically for law enforcement. Other preserves utilize less confrontational tactics (formal and informal education) with the locals to protect the borders. Managers of each zapovednik must assess its unique position and decide accordingly on a strategy to maintain the integrity of protected areas.

## Expanding the System

Russia’s goal is to place approximately 5 percent of its total land area within zapovedniki and national parks by 2005. The total is now about 1.92 percent, with 1.53 percent in zapovedniki. This is an ambitious goal (perhaps unrealistic) considering the lack of available funds for protection and research. However, despite limited financial resources the

**Table 1**—Number of violations by category reported by 75 zapovedniki in 1995 and 1996.

Type of violation	1995	1996
Treefelling incidents	171	171
Hay making and livestock grazing	61	80
Hunting	381	439
Fishing	839	712
Harvesting wild plants	348	219
Seizure of land and then building structures (small cabins or dachas)	8	38
Passage by foot or vehicle	906	710
Poaching of large ungulates and carnivores (this includes two polar bears)	85	94
Other	142	133
Total	2,941	2,596

government continues to designate new, large zapovedniki. In 1991, 77 zapovedniki protected 19,913,600 ha and in 1997, 95 preserves protect 31,026,600 ha—a 56 percent increase (Stepanitski 1997a). According to Director Knorre of the Stolby Zapovednik, “This is like giving birth to the poor.”

In fact, many of the recent additions are in areas that will not be contested by economic interests or are in regions with a very low population density. The lack of inspectors to protect zapovednik borders may not be an immediate problem. The Putoranski Zapovednik was established in 1990 and is 2,200,000 ha, the Bolshaya Arctic Zapovednik is over 4 million ha, but both preserves are remote—above 70 degrees north in Central Siberia—and far from population centers. Several authorities suggest that the system should focus on the relatively rare steppe ecosystems in European Russia or the Far Eastern habitat of Siberian tigers. Nonetheless, the recent additions represent an incredible commitment to future preservation efforts. If the Russian Federation is going to meet its goal to protect all representative ecosystems, the creation of new zapovedniki must accompany the expansion of old zapovedniki in threatened areas. International environmental organizations make the legitimate point that never will land be easier to set aside than while 95 percent of the land remains under government control.

As the strategy develops to include more land under the zapovednik system, Russian politicians, scientists, and local environmental organizations use several techniques for temporary protection. Most frequently, areas are identified that (1) are noteworthy for harboring rare and endangered plants and animals, (2) include habitat critical for all or part of a species’ life cycle, (3) act as buffer zones for existing protected areas, and (4) are unique and typical ecosystems that are not already represented within the system. After identifying significant areas, advocates work to have the area designated as a zakaznik—a special management area without the status of a zapovednik (and corresponding staff and budget). The designation as a zakaznik sets a precedent and expedites stricter regulation in the future. Zakazniki often allow access and restricted activities such as hunting, fishing, and wildlife management (Sobolev and others 1995).

## Budget Constraints

Before 1991, nearly all of zapovednik funding came from the central authorities. After a 60 to 80 percent reduction in operating funds through 1993, a crisis appeared to be inevitable. Managers responded to the pressure with a wide variety of strategies. In 1994, zapovedniki enlisted financial support from regional authorities, the newly established "ecological funds" that resulted from pollution taxes, city administrations, business organizations, citizen supporters, national and international research universities, international granting agencies, and philanthropic funds. Although each preserve met with varying degrees of success, in general, budgets remained inadequate. Many employees shifted to tending gardens and raising livestock to survive (Ostergren 1997).

Since 1994, the resources have shifted, and a more accurate picture of funding was available in 1996 (Stepanitski 1997b). In 1996, the overall budget was \$9,936,215 U.S. dollars, of which the Federal government supplied 68 percent or \$6,816,939 U.S. dollars. Obviously, the system is still heavily dependent on Federal funds. Furthermore, the funds are not distributed equally and depend on size, age, use, endangered species, and the efforts of the director to raise funding. Annual budgets ranged from \$488,824 U.S. dollars, to \$17,836 U.S. dollars with an average of \$123,754 U.S. dollars. Although zapovednik directors consider this an altogether inadequate budget, there are reasons to remain optimistic.

First and foremost, the zapovedniki still exist and are expanding. Another illustration of the positive trend is the effort by organizations such as the Biodiversity Conservation Center (BCC). By lobbying the government and searching for outside funds, the 1996 budget was actually up 30 percent from the budget anticipated at the beginning of the year. Sources for extra-governmental funding include foreign (7.2 percent), regional support from subjects of the Russian Federation (14.3 percent), municipal funds, ecological funds (although these have declined because money is now directed toward more pressing problems such as clean water or breathable air), and domestic donations from industry and banks (Stepanitski 1997b). The diversification of funding sources helps zapovedniki operate in the short run, but long-term solutions and large increases in operating budgets will require a greater commitment from Federal sources.

## Glimpses into the Future

In the near future, the Federal budget will certainly limit the size and scope of solutions for zapovedniki. Currently, the Federal government is making an unparalleled land investment for the future by protecting millions of hectares in various ecosystems. Unfortunately, this raises the specter of "paper" preserves, and indeed, 11 zapovedniki in 1996 did not operate as "fully functioning preserves." What should be done in the near future? We conclude by discussing how the Russian and global conservation community can support the world's largest research-oriented conservation system.

Zapovedniki can be further incorporated into international conservation efforts. One such model is the UNESCO

MAB Programme. In the mid-1970's, the Russian zapovednik system joined UNESCO's MAB Programme. Although there were some funding benefits, the primary reason for membership was increased interaction with the global community (Pryde 1984; Sokolov 1981). As of 1997, there were 19 zapovedniki incorporated into biosphere reserves, and a priority for the MAB Programme is to standardize all the data on plant and animal species for a computer data bank (Soles 1997). As this system focuses its resources on existing biosphere reserves, it will not be expanding at an appreciable rate in the near future.

Another potential source of support is to join in a regionally integrated research cooperative. For example, Pechorolychksy and Tsentral-Lesnoy Zapovedniki, by protecting large natural and quasi-natural sections of European taiga, could contribute to research in sustainable forestry for all northern European countries. The zapovedniki retain a large portion of the natural biodiversity and would act as controls for experimental areas across the region.

Supporting international research programs is an excellent pathway to support for zapovedniki. European research universities are investigating Arctic zapovedniki and bird populations that migrate from Southern and Southeast Asia. The U.S. National Park Service has become involved in an international protected area that spans the Bering Strait. An unbounded opportunity exists for research projects on Arctic marine ecosystems and wildlife.

International organizations can continue to support the transition to computers and the conversion of data to electronic form. The Sacred Earth Network, Socio-Ecological Union, and Biodiversity Conservation Center have installed electronic mail for 18 zapovedniki. Several other preserves use electronic mail as the most reliable method of communication and are supported by organizations such as the Pacific Environment and Resources Center. It is essential to connect all zapovedniki with electronic mail for annual reports, reliable communication, and the standardization of data collection on flora and fauna. The MABFauna software from the US MAB Programme provides an excellent opportunity to standardize formats and update records.

Although it is an enormous undertaking, the Chronicles of Nature should be converted to electronic form. The potential is incredible for long- and short-term cross referencing and species inventory. The massive amount of long-term data offers potential reference material for research into global warming. Old data from zapovedniki in the former members of the Soviet Union should also be collated and protected for future research. Fellowships and training programs are excellent resources to help staff adopt computers. Computers are fairly reasonable to purchase and offer concrete short- and long-term benefits.

Each preserve is assessing its unique role in the surrounding human and natural communities. A variety of methods have been devised to insure the continued existence of zapovedniki through integration with the community. With an excellent research staff, some zapovedniki have been conducting research on ambient air and water quality in their region. The staff monitor air patterns and the effect of local or distant industry on plants and animals. Some preserves are near enough to population centers to document the effect of new pollution control measures or the potential for health hazards. The local administration should continue collaborative monitoring activities.

A fairly recent enterprise for zapovedniki is environmental education. The alternatives include onsite nature centers for Russian and foreign visitors to understand the role and purpose of zapovedniki. Several preserves have adopted outreach programs that visit local schools or set up in community centers. Besides supplying useful information on local ecosystems to the public, environmental education builds a constituency of support. Enlisting children at an early age reduces the likelihood that they will turn to the zapovednik for food or other purposes as adults. The World Wildlife Fund is supporting several education projects including a video designed to bring the very remote Altaiski Zapovednik into the schools and communities of the region.

One of the greatest benefits after the fall of the Soviet Union is the increase in communication—both nationally and internationally. The Biodiversity Conservation Center has published 19 issues of the “Bulletin for State Zapovednik and National Park Employees.” This bulletin disseminates information about existing travel grants, scientific conferences, and symposia. The interaction and consistent information for all employees unites the organizations and coordinates their mission. The Bulletin also provides information on how to join international societies and subscribe to scientific publications. Any support (financial or administrative) that editors and publishers can give to insure that journals and information is delivered to zapovedniki is critical. It is important that the world conservation and research communities be informed of research findings from zapovedniki as well as deliver recent findings to the research staff in Russia. Other bulletins and newsletters keep the preserves and parks informed of recent policy changes, current events, and the history of research and protection in Russia. By exchanging information, the protected areas share successful and unsuccessful strategies for protection and research.

For international communication, the “Russian Conservation News” is published in English and continues to be an excellent source of information on national parks and zapovedniki. Interested parties may subscribe by writing to PEEC/RCN, R.R. 2, Box 1010; Dingmans Ferry, PA 18328 or E-mailing to <rcn@igc.org>. Dissemination of successful projects and immediate concerns rallies a larger, international community and helps support the zapovednik effort.

## Summary

Initiated just after the turn of the century, zapovedniki have a long tradition of preservation and ecological research. In 1991, the fall of the Soviet Union challenged the commitment of Russia to support a system that spans many of the ecosystems across the nation. Despite limited financial support, the system continues to grow in size and scope. Recent laws have reaffirmed the mission to conduct research and protect rare and typical habitat. To meet the challenges of post-Soviet Russia, directors and administrators have employed international connections, environmental education, stiff law enforcement, information services, and diversification of funding sources. Most authorities are optimistic that the system will persevere through Russia's transition to a world economy. The concern is that conditions in zapovedniki will degenerate or valuable research will lose its continuity. The next few years will determine the future condition and integrity of the zapovednik system.

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## II. Opportunities and Challenges of Wilderness as a Basis for Sustainable Development





# Participatory Rural Appraisal of the Impacts of Tourism on Local Indigenous Communities and National Parks: the Case of the Pemón Kamaracoto

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**Abstract**—Participatory Rural Appraisal was used to assess the Kamaracoto's perceptions of the impacts of tourism in the Valley of Kamarata located within Canaima National Park in Venezuela. Participatory Rural Appraisal proved to be effective in identifying social, cultural, and subsistence values attributed to environmental elements (shifting cultivation, tepuyes, animals, waterfalls, savannas, minerals) and economic activities (such as farming, tourism, and mining). Similarly, sources of important environmental changes that the community has experienced were determined (for example, decrease of animal species diversity and population, decrease in forest resources for building traditional houses and dugout boats, increase in tourist visitation, and increase in youngsters favoring work in tourism over shifting cultivation). The causes of such change and how they affect or will affect the community's sustainability were also determined. The process proved to be valuable for the community in terms of planning community action and proposing regulations seeking to mitigate impacts of non-traditional uses of the Park's resources, such as tourism. In addition, the process was effective in identifying community partnership needs with outside groups (such as, nongovernment organizations and universities) to solve local environmental problems and issues related to tourism and the park.

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It is well known that the creation, and many times imposition, of protected areas on local indigenous people have been a source of conflict and undesirable impacts (Hough 1988; West and Brechin 1991). Although globally many National Parks and other protected areas have clearly recognized indigenous peoples' settlements and their rights to access resources for subsistence (Stevens 1997), still, in many Latin American countries, there are no clear policies or management strategies to deal with human settlements within or at the boundaries of National Parks. As a result, the need has emerged to integrate local populations into establishment, management, and monitoring of Protected

Areas to reduce pressure on natural resources, and to achieve local support for the conservation goals for which these areas were originally established (West and Brechin 1991).

One of the activities strongly linked to Protected Area protection is nature-based tourism (ecotourism). In the last decade many international and national environmental organizations, development agencies, governments, scholars, and tour operators have been pushing ecotourism agendas as national, regional, and local strategies to capitalize on Protected Areas' natural resources without destroying them. Part of the revenue is expected to be earmarked for conservation efforts and to provide local economic benefits, including economic incentives for communities at the periphery or within Protected Areas to replace income loss from restrictions on allowable uses. The increase in the number of ecotourism operators, activities, and travel packages to Protected Areas and the increase in tourist visitation have made pristine, remote, natural, and cultural sites more accessible, integrating these destinations with the global economy and subjecting them in the process to the political economy of tourism (Medina 1996).

A "Participatory Rural Appraisal" methodology was applied to assess the impacts of tourism on indigenous communities and on the National Park of Canaima (Venezuela). Participatory Rural Appraisal was selected as the most effective means to deal with the increasing park and indigenous communities conflicts and the need for management strategies that minimize these conflicts and the negative impacts on Park resources. The long-term goal is to create an atmosphere favorable for establishing a partnership that can benefit both the indigenous people and the Park.

In this paper we (1) argue the need for adopting and institutionalizing participatory approaches for the conservation of Protected Areas, (2) discuss Participatory Rural Appraisal in relationship to the case presented here, and (3) present our study which analyzes the impacts of tourism development on the indigenous communities that live within Canaima National Park.

## Protected Areas, Participation, and Conservation

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Participatory approaches for development are being adopted by multilateral funding agencies such as the World Bank and the Inter-American Development Bank (Schwartz and Deruyttere 1996) to assure that development projects

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succeed not only in their design, but also in their implementation, evaluation, sustainability, and most importantly in delivering benefits to end users. This realization came only after years of unsuccessful “top-down authority,” “non-developmental,” and “outsider” approaches to “planned change.” Conservation has to be a widely participatory process to bring about and harmonize environmental protection with social and material advancement. This conception stresses the capacity of people to control their situation and manage their environment. It is concerned with equality and equity; it emphasizes citizen participation; it focuses on enhancing local self-reliance; and it involves integrating traditional local knowledge with scientific knowledge. Under this view of conservation, participation is needed for conflict management in issues related to protected area-people interactions. In addition, participation has been identified as key in (a) mitigating negative social and economic impacts of environmental policies and development projects—by legitimizing them; (b) improving management efforts; and (c) building support, partnership, and co-management arrangements with local stakeholders.

An exclusionary and centralized concept of National Parks has been maintained widely in Latin American policy and practice, neglecting the historical, political, and social context of these countries. In this way, government agencies tend to be strong in top-down authority and hierarchy, as evidenced by the scale, bureaucracy, and level of enforcement of their decisions and operations. Also, very little experience has been gathered to value participation and its potential; managers are not trained in participation processes, and there is no budget allocation for implementing participation programs and mechanisms. Participation, whether in development or in conservation, is a long-term process and a political one (Peters 1996). Although cost-effective in the long run (Schwartz and Deruyttere 1996), it requires special interpersonal and managerial skills, and other conditions to be able to incorporate it and institutionalize it in Protected Area management strategies (for a recent discussion see Borrini-Feyerabend 1997). Until these conditions are met, participatory approaches are most likely to find resistance among governmental Protected Area agencies. Therefore, it is not surprising that many countries do not have any participatory approaches, community consultation mechanisms, or institutional arrangements in place that can involve local stakeholders in decisionmaking and sharing resource management responsibilities of National Parks. Similarly, it is not surprising that park and people problems and lack of support for Protected Areas continue.

## Participatory Rural Appraisal

Participatory Rural Appraisal is regarded as an approach (or a series of methods) to learning about local life and conditions, “from, with, and by,” local people (Chambers 1994a). Chambers explains that the approach and methods have the intention of enabling local people to share, enhance, and analyze their knowledge of life and conditions, to plan, to act, monitor, and evaluate. Participatory Rural Appraisal has been used in many countries and applied in a variety of fields (sectors) and settings including agriculture research

and extension, poverty and social programs, health and food security, and natural resource management (Chambers 1994a,b). To a lesser extent Participatory Rural Appraisal has been used in park conflict resolution (Hoyle 1995; Mason and Danso 1995; Rodriguez and Sharpe 1996) and tourism impacts (Tomintoul Community 1994). The approach has proved to be a powerful one, in many cases generating valid and reliable data (Chambers 1994b).

Empowerment is reached in the planning process because information in Participatory Rural Appraisal is internally produced, analyzed, owned and shared by local people instead of just gathered and analyzed with the biases of outsiders (Chambers 1994b). The role of the outsiders in this approach is more as a convenor, catalyst or facilitator of the means for people to undertake and share their own investigations and analyses (Chambers 1994a).

Empowerment also comes from transferring leadership to locals, valuing their knowledge and generating opportunities and environments, so they can extend their knowledge and acquire new skills and abilities such as: systematic analysis of problems, designing plans, establishing priorities, formulating strategies, implementing activities in an organized manner, evaluating them, and distributing their benefits (Valarezo 1993). In conservation, only by generating empowerment can local communities assist in the protection of the Park. In this view, empowerment creates the environment such that the solutions to local issues can come from initiatives from within the communities—with or without outsider partnerships. New proposals, projects, or programs for conservation can and should come from local communities, but from communities that are organized and that have the capacity to formulate and negotiate them.

This case study centers on the impacts of tourism development on the Pemón-Kamarakoto community in Canaima National Park. From previous studies, it was known that the Pemón-Kamarakoto communities have manifested an interest in participating in Park management affairs; they are aware of their dependence on Park resources and know that they have a direct stake in the protection of the Park given their historical and cultural relation to the land they inhabit and their economic and social dependency on it. They have specific knowledge of the natural resources of the Park, and they maintain local institutional arrangements and abilities useful for management. They have proximity to places where problems occur that allows them to experience directly changes and impacts. In addition, they have representative local institutions that defend the rights of their community members, and they have a level of social organization that allows them to function as a community to maintain a working relationship with Park officials.

## Canaima National Park and the Pemón Situation

Venezuela has 15 percent of its territory designated as National Park lands, distributed among 43 Parks. In addition, and with no exception, all of the parks have conflicts with human settlements living within or at their borders. In 1982, 13 percent (18,626) of the Venezuelan indigenous population inhabited at least eight of the major National Parks. This percentage was distributed among

304 communities and consisted of nine ethnic groups: Bari, Yupka, Pumé, Hiwi (or Guajibó), Piaroa, Yanomami, Sanema, Pemon, and Warao (Lizarralde 1992). Canaima National Park, the focus of this paper, was created in 1962 and extended in 1975 to its current size. Located in the Bolívar State (southeastern Venezuela) in a region that lies on the Precambrian Guayana Shield (one of the most ancient land surfaces of South America), Canaima National park is one of the largest in the Americas, covering an area of 30,000 km<sup>2</sup> (7,413,000 acres). As part of the Venezuelan Guayana, it contains incredible ecological diversity due to its natural history, geomorphological formations and altitudinal variations, soil properties, and different climatic regimes. The vegetation cover of this part of the Guayana region consists of forest, shrub, herbaceous, and pioneer formations found in the different ecosystems of evergreen and semideciduous forest, savanna, and tepuis (flat-top mountains formed by Precambrian core of igneous and metamorphic basement rocks covered by large layers of sediment, with an age estimated at 6 billion years). The varieties of ecosystems in Canaima support a wide range of habitats and niches that in turn support a highly diverse number of ferns, flowering plants, trees, fauna, arthropods, and many endemic and endangered species.

Canaima National Park protects between 60 to 70 percent of the Caroní River Basin (95,000 km<sup>2</sup>), which is drained by two large river systems—the Caroní and Paragua Rivers. The Basin is the only source of water for two hydroelectric dams that provide electricity to operate important industrial plants and supply electric service to other areas in Venezuela (and soon to Brazil). In 1993, Canaima was declared a World Heritage Site by UNESCO. The preservation (for present and future generations) of such an incredible resource constitutes a challenge to Venezuelan society.

## The Pemón Amerindians in Canaima National Park

Canaima is located in the Gran Sabana Municipium, which has an indigenous population of 13,051 inhabitants of different ethnic backgrounds. The Pemón's population is the largest in the whole Municipium, representing nearly 99 percent of the total population. In 1992, there were 8,094 indigenous people (0.27 inhabitant per square kilometer) in the Park itself, distributed in 94 settlements. The Pemón (as they call themselves) belong to the Carib-speaking family and are divided into three groups (Arecunas, Kamaracotos, and Taurepan) concentrated in different parts of the Gran Sabana and with different dialects—possibly mutually intelligible (Thomas 1982).

Approximately 500 to 600 years ago, the Pemón began occupying the Gran Sabana uplands, immigrating from adjacent savannas. The Pemón were the first among four successive immigrations of Carib family groups that populated Venezuela in the so-called "fourth wave" (CONAHOTU 1972). The Pemón live in settlements mostly in open savanna near rivers, and are highly dependent on the surrounding forest resources and rivers for their subsistence. They have traditionally been small farmers or "conuqueros" (using the system of slash and burn for cultivation), hunters of birds and terrestrial mammals, fishermen, small-scale

breeders of domestic animals, and gatherers (Simpson 1940; Thomas 1982; Urbina 1979). The Pemón have shown great adaptation to the difficult and very limiting living conditions in the uplands, which are known to be unsuitable for intensive agricultural practices (due to the depthless substrate, low nutrient contents, and highly unfavorable chemical properties), and where game is dispersed on forest slopes, and where fish resources are scarce because of small water bodies and generally swift currents. These conditions make cropping cycles in conucos (swiddens) short, natural regeneration cycles slow, and hunting and fishing very inefficient.

Many factors are influencing the Pemón society within Canaima. Their traditional life styles are impacted, and their balanced resource relation with the Gran Sabana environment is changing. Today the Pemón are experiencing the difficulties of rising population growth and changes in social structure.

The Pemón have a long history of external influences, cultural intervention, and expropriation of land. The creation of Canaima National Park in 1962 recognized the cultural values of the Pemón communities (including their areas of settlement and traditions) and contemplated the incorporation of the indigenous communities into the administration and management of the Park (Gaceta Oficial 1991). But like many other communities within National Parks in Venezuela, the Pemón have been affected historically by restrictions in the use of park resources. Little has been documented in this regard, however. Hydroelectric and mining projects sponsored by the Venezuelan Corporation of Guayana, expansion of road systems, increasing unregulated tourism activities, and a history of missionization and agriculture extension work have threatened the Pemón resource base and their traditional agricultural and hunting practices, their traditional economic activities, and their patterns of settlement, land use, and housing. Finally, 71 percent of the communities within Canaima have no documents of land ownership, and 36 percent have some kind of land conflicts with companies, official organizations, state enterprises, farms, or ranches.

A concern of ecologists and park managers in the Gran Sabana with direct, long-term impacts on hydrological cycles and erosional processes is the continuous substitution of forest by savanna, and the subsequent degradation of the latter on a large scale. Anthropogenic causes include the practice of burning in both forest and savanna areas by indigenous people, as well as agriculture, cattle-raising, hunting, mining, timber extraction, and tourism activities. Natural causes have been attributed to successional trends, dependent on both climatic changes and fire.

The National Park of Canaima is considered the first and most important tourism destination in Venezuela. It has high demand among foreign tourists and is experiencing increasing visitation. In a study of 280 tourism packages in Venezuela, Canaima by itself represented 9.4 percent of the destinations marketed. A recent study estimates that between 1991 and 1995 the number of visitors to Canaima National Park increased from 78,488 to 121,101 (Medina 1996).

Many international and national tourism organizations and agencies are establishing, operating and extending "ecotourism" systems in Canaima, looking for remote and unique destinations within the Park in order to keep

exclusivity and elude the great concentration of visitors that are arriving. Under Venezuela's Law of Tourism (Articles 59 and 60), prior consultation with indigenous communities is explicitly required before any tourism development can go ahead in their areas. Unfortunately, consultation is not a common practice in National Parks, and indigenous communities are marginalized from any decisionmaking regarding tourism development on the lands they occupy. Tourism organizations and agencies are operating without being properly evaluated in terms of their contribution to the conservation of the Park and in terms of how much they benefit local communities. Similarly, given the restrictions that the National Park sets for human settlements in their boundaries, and the limitation of the environment, an increasing number of indigenous people are looking at tourism as an option for development. Many communities are soliciting permits from the Park Service for tourism purposes and depend on national and international enterprises for tourist contact, goods, and supplies. They have little control over the tourism activity, and are not fully aware of the potential negative impacts of tourism for the community and its natural environment.

## The Study Site

The study site is the Valley of Kamarata, located in the west sector of the Park. This zone is approximately 50 km long and 15 km wide. The spur of the Auyantepui falls in the north and the east. The valley is relatively flat and presents a scenic view typical of large, and small, open savannas.

The Kamarata Valley has an estimated population of 2,101 indigenous people (2.8 inhabitants per square kilometer) distributed in 21 settlements, comprising approximately 328 households (Medina 1996). According to these estimations, the Kamarata Valley holds 26 percent of the entire indigenous population in the park and 2.5 percent of the total land surface. The Valley is relatively isolated. The only way to get there is by foot, dugout boats through the Acanán River, or by airplane. This makes the Valley an interesting study site because its remoteness controls many intervening and influential factors that exist in the more accessible east sector of the Park where a road system connects the Park with the capital of the Bolivar State and towns in the north of Brazil.

In the Valley, there are two tourist camps (Kavak and Uruyen) with different levels of tourism development. Kavak has been in operation for more than 15 years, while Uruyen has only recently begun operation. Both camps are operated by national airlines and tour operators (under concession with the Park Service), and are owned and managed by a local civil association (Asociación Civil Kavak-Yeuta) and three local "microempresas" (private enterprises under contract with the airlines). Tourism transportation into the Valley occurs through daily flights from Margarita Island, Ciudad Bolivar, and the tourism center of Canaima. Between 1991 and 1995 the number of visitors in Kavak increased slightly from 11,427 to 12,314. Uruyen received in 1995 only 1,453 visitors (Medina 1996). Tourists from Kavak and Uruyen, combined, represent 11.4 percent of the total visitation level in the Park. These data do not include visitors coming to the Valley by dugout boats (curiaras) through the Acanán river in fluvial excursions from

Canaima. They also do not include visitors from private planes nor from two of the private local enterprises.

## Methodology: The Workshop

The Participatory Rural Appraisal approach was carried out in the methodological form of a workshop. The workshop took place in the Kamarata community in a rural school on two consecutive days (14 and 15 of September 1996). The workshop was designed to (a) understand the Pemón (Kamaracotos Indians) community's environmental values and (b) determine the community's perceived social and environmental changes and consequences due to tourism and other human geographical factors.

No specific criteria for selecting participants were set other than to ask that participants be adults who lived in the valley and who wanted to participate on a voluntary basis. The group of participants turned out to be 11 people, an ideal size for the group dynamics required by the methodology. The group size gave opportunities to share insights and was large enough to provide a diversity of views. The group included four women and seven men. It included two elderly men, four adult men, one adult woman, one young adult man, and three young adult women. The group also represented three of the largest settlements. Two of the men were the current chiefs (capitanes) of their communities and one woman was a former capitan. Interestingly, there were two elementary school teachers (one man and one woman), two women involved in an arts and crafts business, two tour guides (one man and one woman), and one technician (man) who worked for the Venezuelan Electric Company monitoring weather in the Valley. This group heterogeneity resulted in a very productive meeting.

The workshop can be described as a framed but semi-structured discussion and brainstorming in a group dynamic similar to a focus group. First, participants were asked to name elements in the Valley that were relevant and important to them. Then, participants were divided into small groups of two to three people where they selected one element and discussed its importance. This was followed by a discussion of what changes they have observed in relation to the element, what causes they attribute to such changes, and what they believed were the consequences of such changes. After this discussion each group would present to the rest of the participants the results of their discussion. Interestingly, the format allowed discussion of trends, and consequences of such trends, without having a true baseline for comparison other than the participants' observations and analysis. At this point, as in many Participatory Rural Appraisal processes, everybody had the opportunity to ask questions and verify the validity of the information by cross-checking and amending each other, building upon what was already discussed, adding new insights and analysis. The workshop tried to center on endemic information, meaning in the knowledge, and categories and values of the local participants instead of the views of the facilitators. Nonetheless, on many occasions the facilitators probed and synthesized information, interpretations, and opinions for the sake of clarifying points and recorded the information as accurately as possible. The facilitators' role was to guide the process and foster a two-way learning experience between facilitators and local participants, creating an atmosphere

for communication and understanding of the different views of the problems and needs.

Ten elements from the Valley were chosen by participants as most important. They were (not in order of importance): selva or rainforest, flat-topped mountains (tepuy), savanna, moriche palms, rivers and waterfalls, fish, animals, minerals, the community, and visitors. These elements suggest how intricate is the relation of the Pemón Kamaracoto with their natural environment. It does not seem to be an accident that those elements chosen hold intrinsic subsistence and cultural values for the Kamaracoto, possibly because they are the basis for their survival as a community and as indigenous people. Each of these elements will be presented, emphasizing their relative importance to workshop participants, underlying changes to the elements, and the causes and consequences attributed to such changes, stressing the impacts due to tourism.

## Rainforest

The rainforest (ichureta) represents for the Kamaracoto a sacred place. It is the place where most of the shifting cultivation activity (the agricultural system most used by the Pemón communities) takes place, providing them with their principal source of food. Its importance is reflected in the number of conucos and the land surface each family unit allocates, including the time they spend for such practices. The forest supplies the Pemón with logs, wood, and palm leaves (Cucurito and San Pablo leaves) to make their homes (churuatas). Logs are also used for building dugout boats (curiaras), paddles (canaletes), and other wooden and fiber materials needed for arts and crafts and for manufacturing instruments, for example, squeezer (sebucan - tangöi), receptacles (bateas, moru, watea and pangai) for the preparation of the casabe (eke - baked manioc bread cakes) and kachiri (a beer-like fermented beverage made from bitter manioc). In the forest are animals and birds for hunting, and the many creeks provide drinking water and small fish. Other resources from the forest include medicines, materials for making clothes, and barbasco (fish "poison") for fishing.

In regard to changes in the rainforest, the group observed that there are now more shifting cultivation plots and many more people working in conucos. Currently, the older Kamaracotos are for the most part the ones that work in the conucos. The production of cultigen is less diverse than before, and casabe and plantains are produced not only for subsistence but also for commerce. The conucos are now located farther away from each household. This is due in part to the conuco cycle, which leaves the land fallow after 2 or 3 years of cultivation (even more in the Valley), and new fertile land is sought. The group observed that the closest and largest tracts of fertile land have already been used and they are now in their fallow period. Some believe that the forest does not regenerate in its totality after the conucos. Regeneration of the forest is slow, and the fallow period has been estimated at between 20 to 25 years or more. New types of trees grow in the abandoned conucos (probably pioneer species after the gap left by conucos), but there is uncertainty that these new species may be different from the original strong, large trees that were cut when preparing the plots.

Trees for making churuatas or building curiaras, as well as the San Pablo and Cucurito palm leaves, are scarce because many of them have been harvested and are not found close by anymore. Many of these resources have to be brought from places in the upper river or bought from other remote settlements. Medicinal plants are not used as much, and forest products are not utilized to fabricate clothes anymore. However, more crafts are made from forest materials. The trend is towards less consumption and production of traditional medicines and, consequently, the potential loss of the knowledge base needed to acquire these resources.

The changes in the conucos and the depletion of many forest resources are attributed to population growth, new market opportunities to sell conuco products, and requirements of the tourism business. There are now more incentives to produce manioc (yucca) in the conucos on a commercial basis. The casabe is sold now for tourism centers (such as Canaima), and to tourism workers and other community members (such as school teachers) who do not work intensively in their conucos. On the other hand, the participants feel that tourism requires (obligates) the use of logwood and palm leaves to build churuatas for tourists as well as for the construction of more curiaras for transporting tourists. The image of "authenticity" and uniqueness of the Valley's natural and cultural resources is something that is sold through outside tour operators' promotions and advertising.

Based on trends, the group foresees the cultivation of more or larger conucos, but less available forest. This may require extending the cultivation of the conucos or reducing the fallow period of many regenerating secondary forests, or both. The Kamaracoto perceive that the conuco production will be increasingly geared towards commercial objectives and less toward subsistence purposes. The conucos will be less diversified, requiring the purchase of certain products from others or the local stores. Also, they perceive that there will be an increase in the creation of large community conucos for generating revenues to pay for community needs, goods, or services.

## Tepuis

The tepuis (mesas or flat-topped mountains) mark the geographical location where the Pemón communities are found and delineate their land boundaries. Rivers form in the tepuis and provide places for recreation and education for many outsiders. Tepuis are considered sacred "temples" where the mawari or imawariton (evil or good spirits who look like Pemón people but can take the shape of animals) live. The piaches (shamans) find in the tepuis a sanctuary for their inspiration and also a place to learn directly from the mawari. Each tepuy has its own legend found in some of the Pemón myth and stories. Some of the tepuy carry names of important events, places, or caciques (political leaders).

In relation to trends, there is an increase in the number of paths accessing the mountain tops along which trampling and trash is easily observed (despite prohibition of climbing in the tepuis until management plans and monitor mechanisms are in place). Many of the traditional names of the tepuis, rivers, and waterfalls have been changed by outsiders (as observed in tourist and official maps), and many sacred places are not respected. Invasions of sacred places include landing small airplanes, placing antennas for

communication over the tepuis, and removal of endemic plant species by researchers, botanists, and tourists. Other observations include cases of accidental fires. The Kamaracotos feel that the community has made no effort and taken no actions to keep traditional names and protect sacred places .

These trends are attributed to the creation of the Park, more tourists, and the promotion of the area to researchers and important personalities. Also, it is attributed to the myriad of exploration, research, and management activities of government agencies and universities, and to the activities of advertising and film enterprises. As a consequence, tepuis can lose their beauty and attractiveness. The proper names of the tepuis will be forgotten and the young Kamaracotos will not respect the tepuis as sacred places.

## Savanna

The savanna (itöi) is where the Pemón build their houses and churuatas near water courses or streams. They live in the savanna because they respect and fear the forest, and for security reasons, given the greater visibility in the savanna. In the savanna, it is easier to create pathways to more rapidly access other settlements or places, and its openness allows for using signals for communication. The savanna is habitat for small animals and insects such as larvae of the moriche palm, grasshoppers, and ants, which are part of the Pemón diet. Also, it is easier to fish in small streams in the savanna during the winter season. Whereas the savanna is known to be unproductive, it is important for small-scale agriculture and cattle grazing. The savanna is also a tourism attraction, something that is not surprising given the uniqueness of this type of ecosystem, found only in 2 percent of the land comprising the west side of Canaima Park.

The Valley has a history of agricultural development and cattle ranching in the savanna, following the activities of missionaries. Forests were cut to create open space for cattle and for cultivating rice; these areas were later converted into grazing areas. The savanna was divided into ranching and grazing areas by fences and wires that are still in place. Today, some conucos produce rice, but very few families keep cattle.

Changes in the Savanna are attributed to population growth in large settlements, changes in conuco areas, patterns of conuco exploitation for commercialization and tourism, uncontrolled fires, and transportation needs. There are certainly more human settlements in the savanna, and the tendency now is to set up conucos in savanna forests close to the settlements instead of cultivating in the mountain forest. Some of these conucos are owned by local tourism businesses to sell watermelons, pineapples, and sweet or bitter manioc. The problem with the conucos in these forests is that they tend to be replaced by savannas because of the forests' low recovery capacity and frequent fires.

It is well documented that the Pemón use fire not only to clear land for their conucos but also for hunting, communicating, and rejuvenating grasses in dry savanna areas to avoid extensive fires due to long dry seasons. Today in the Valley the savanna is burned many times out of season because of access to fuel and because many young people do not know how to burn the savanna. They abuse

the fields with fires. Hence, other species, different from the savanna grasses rejuvenate, changing the savanna environment.

On the other hand, more walking trails and roads for vehicles are open, compacting the land surface, making it almost impossible for the savanna to regenerate. The vehicles are used for transporting people to different settlements and tourism camps. They are used to transport tourists to attractions or to the river for transportation in curiaras. Also, they are used to transport water in the dry season or to transport goods for the local stores.

Other changes observed include the introduction over time of fruit trees that are not endemic to the area (mango, coconut, orange, mandarin, and guayaba) and the accumulation of large deposits of waste and garbage in the savanna, products of the communities and tourism camp activities. No plans exist for their treatment.

The wood that is used for fuel is found mainly in the conucos. For tourism, firewood is purchased from the conuqueros or is cut from small trees and shrubs in the savanna. Fairly recently, tour operators have adopted kerosene or gas stoves to cook meals for tourists, and wood is used only for large grills.

The participants did not see changes in the savanna as major issues and consider that these trends will not affect new settlements because it is still a very livable place. Conversely, they see the potential of environmental and health problems due to fires, litter, and non-degradable trash. Also, there are possibilities of forests with new tree species, more tourism camps in the savanna, and less available sources for firewood.

## Moriche Palm

The moriche palm (kuaiküta) indicates to the Pemón where true water deposits are in the savanna. Moriche is a source of food (such as fruits [kuai, and larvae] and ivo) for animals and people. With the leaves of the moriche, the Kamaracotos build part of their houses, and the palm supplies materials for arts and crafts such as chinchorros (hammocks), typical vestment, and adornment. However, these resources are not the main sources traditionally used for arts and crafts.

Originally, morichales were deforested in the Valley to build roads and airstrips, but now many of those areas have regenerated. The use of the moriche palm is still not extensive and is harvested in a traditional way, gathering fruits and larvae on a small scale. The surplus of larvae is now sold, when it used to be traded. Yet, the Kamaracoto state that there is an increase in the exploitation of moriche leaves because they replace the San Pablo and Cucurito palm leaves from the forest (these leaves are scarce, hard to obtain, or expensive) to make things. Hence, the exploitation of the moriche palm is expected to increase for building traditional houses and for possible use in commercial craft-making specifically for tourism.

## Rivers and Waterfalls

The rivers (tuna) and waterfalls (wena) are also considered sacred places by the Kamaracoto. Rivers are habitat for fish and are essential for animal, plant, and human life.

Rivers and streams define geographical places and territorial land, as well as define names of caciques, important events, or the names of settlements. Many tourism enterprises have even adopted names of local waterfalls and rivers. The Kamaracoto know that rivers contain water that evaporates, precipitates, and then irrigates their conucos, and they know very well the behavioral patterns of the river levels in rainy and dry seasons. Rivers are a source of fish, a means for transportation to reach their conucos and hunting places, and are important to commerce and for fluvial tourism. They provide natural pools for bathing, hygiene, and recreation such as swimming and curiara races. Waterfalls have hydraulic potential for electricity, and certainly are tourist attractions. Kamarata has built a small dam with outside assistance near the town that supplies electricity to approximately 516 people. Also, the Kamaracoto have built a water supply system in partnership with the mission that brings water from the Auyantepui ("la toma") and provides water to five settlements (760 people approximately) through a 25 km system of pipes.

Trends related to rivers and waterfalls are attributed again to population growth and behavior, environmental limitations, adoption of new lifestyles, and the increase in tourist visitation, activities, and services. Today, more bridges are found across streams in the savanna, indicating more people traveling across the savanna. Conucos are being constructed along rivers in communities such as Kuana and Awaraparú, probably because of the lack of forest for conucos nearby or because people are taking advantage of beaches on the riverbanks that hold mineral-rich and freshly deposited sediments.

Frequently, the use of soap, shampoo, and detergent is observed in the rivers for bathing or washing dishes and sometimes gasoline from motor boats is discharged in the rivers. There is an increase in the construction of tourist camps around waterfalls, and there is an increase in infrastructure development for tourists near or at riverbanks, such as new docks and churuatas. The principal tourist camps have constructed septic tanks close to the rivers. As part of the expansion of the sites to visit, tour guides now take tourists farther up the mountain, visiting places such as "la toma" (which is the source of water for Kamarata) for sightseeing and bathing. All these issues, until now, were not perceived as problems, but the group now foresees that if these trends continue there will be more contamination of the rivers, less fish, potential diseases in the community, and contamination or obstruction of the water supply system of the Kamarata community.

## Fish

The fish (muró) are the best components of the river, given their variety, according to the Pemón. Fish such as the aimara and boquini are a more important source of protein for the Kamaracoto than are game animals, and are one of the reasons their settlements are found close to watercourses. Tüma, a type of soup prepared with water, fish, different types of peppers, and kumachi (condiment), is a common meal among the Kamaracoto and is often prepared for social gatherings.

The Kamaracoto have observed that each time they go fishing, the fish are less abundant and smaller. There are

no aimaras or muisunu, and only small sardines and inedible fish are found (terecages). This could be a sign of depletion of the fish population due to overconsumption, or simply the emigration of the large fish. This is an area for further inquiry.

There are also changes in the traditional techniques of fishing. Barbasco (fish poison) is not as plentiful in the forest as it used to be; ritual practices related to fishing have changed, and the sacred stones for different species of fish are gone. Some people now use diving masks, small bows and arrows, and fishing nets (atarrayas). A less impacting (conservationist) method for fishing such as "kuna" (a plant species mixed with other substances and prepared in the form of small balls that attract fish) are not used anymore because the method is not known among the younger generations.

The causes of some of the changes are attributed to the increase in human population and noise and the increased use of motors on curiaras for commerce and tourism, which scare away the big fish to more serene places. Also, fish have become accustomed to the fish bait used and it needs to be changed.

The Kamaracoto expect, as a consequence, less fish in the river and less consumption of fish protein. One of the solutions agreed upon by the community is not to fish with barbascos in the Acanán River (the major river in the valley) until the fish population grows. Now fish has to be brought from outside (mainly by local businesses) and is very expensive for the locals. Many fish that are sold are contaminated with mercury because they come from rivers where gold is mined.

## Animals

Animals (oto or toron) are intrinsic to nature and give life to the Pemón people. Indigenous communities tend to settle around areas where animals are abundant. Animals are a source of food, medicine, trophies, and are resources for making utensils, instruments, arts, crafts, and adornment. Some animals are important to the Kamaracoto for spatial orientation and as indicators of the seasons (such as frogs and birds). Many also alert residents when someone is coming. Some animals are kept as pets. Dogs often help in hunting parties.

The Kamaracoto know that there are seasonal variations or patterns in the availability of game, yet they observe that game animals and birds in the mountain forest, and many large savanna animals (such as deer, tapir, iguanas, and anteater bears) and insects, are not easily found. The Valley has experienced game depletion, or the Kamaracotos have scared away animals and birds, including inedible species. Zamuros are the only bird species observed to have increased. Hunting places are now found far away, requiring long hunting events (1 week or more) that are intensive and inefficient. Other impacts to animals likely include the increase in noise from radios, firearms, machines to grate manioc, and airplanes that fly daily in and out of the valley.

Hunting practices have changed also, including rituals, traditions, techniques and strategies. Firearms are commonly used, hunting parties are not organized, and hunting is less communal. Increases in fires are related to disorganized hunting events and use of fuels. The cost of

ammunition and other materials for hunting is expensive. Resources such as cerbatanas (blow guns), curare, and other resources have to be purchased in other areas because such materials are not found locally. Currently there are fewer people who hunt, and sources of animal protein have to be bought in Kamarata.

The Kamaracoto expect, based on the trends they observe, local depletion of animals. This would require traveling long distances to hunt, building camps in remote hunting areas, and the use of more dogs for hunting. If not, the tendency will be to hunt less and depend on local stores for meat or to migrate to the north of the valley. Another possible outcome is that people will begin to domesticate endemic animals or introduce animals such as sheep, chicken, and other livestock for food (something that is against the Park law).

Again, population growth, changes in hunting practices, and noise seem to be the major sources that account for animal population trends. Tourism seems to play a small role in these trends. All of the food for tourists is brought from the cities.

## Minerals

Minerals (tötepelken) and the soil in the Valley are considered to be patrimony of the underground soil of the land the Kamaracoto inhabit. The clay that is found in some parts of the Valley (called Caolin) is used by women to manufacture unique pottery. These pots and pans (o.ina) are used for cooking and, until fairly recently, for trade in different parts of the region. On the other hand, the Kamaracoto know that diamonds and gold can be found in the Valley and that they can bring monetary benefits according to their scale of exploitation.

Among the changes that the group has observed in regard to minerals are that there is less exploitation and the "bullas" (boom of diamond or gold diggings) are sporadic, although they recognize that the value of the minerals has increased since the creation of the Park and the Park law (mostly when the INPARQUES is able to enforce the law). Mining has been closely controlled by the community because of its negative impacts, and miners have shifted toward job opportunities in tourism.

Mining still remains insignificant in the Kamaracoto culture, as when Simpson did his study in the Valley in 1939, probably because gold and diamond deposits are scarce. Yet, the Kamaracoto believe that mining diversifies the options for jobs in the Valley, and that the artisan (traditional) type of mining is more beneficial than the more technical intensive type. The Kamaracoto have had two major "bullas" experiences that brought conflict in the community, and they are very much aware of problems related to mining. Mining means the abandonment of the conuco (with consequences for the food supply), significant environmental devastation, outsider migration, and the increase of diseases such as paludismo and venereal infections.

The production of traditional pots and pans has significantly slowed. There is little transfer of knowledge to the younger generations on how to make the pots. The small production of pots is for tourists and their price is too high for people in the community.

## Community

For the Kamaracoto, the community (patamuna) is the organizational base that identifies them as indigenous people. They perceive the community as the ground of their social relations, communication, and education, and it is the vehicle for preserving traditions, customs, and other cultural traits. The Kamaracoto people believe that they defend the natural environment and that they contribute to the development of the country by preserving nature for life.

The Kamaracoto observe important changes concerning their social organization with reference to the level of cohesiveness as a community, transculturation, and education. The Kamaracoto observe that whereas before they had one community, now it is divided not only geographically (one town and several small settlements) but also socioeconomically. The division or fragmentation of the community is attributed to the establishment of new leaders and new economic groups represented by tourism microenterprises and commercial stores as well as power groups influenced by politicians during election years. Another factor in fragmentation has been the creation of a civil association to attend to tourism. This parallel organizational structure has gained power because it administers the revenues from tourism, which are significantly higher and increasing compared to any other source of income within the Valley. This has been a source of conflict with the traditional structure of decisionmaking in the Kamarata community. Allegations of corruption, debts, stolen money, and misapplication of resources have surrounded the association. There is a generalized perception that the different settlements that helped in the development of the infrastructure for tourism have not received the benefits from tourism as expected. This problem seems to be mostly a lack of training in business management and uneven and unfair business relations with outside tour operators. With certainty, the Kamaracoto believe that these divisions create conflict and misunderstanding, and seem to affect the community's ability to act cooperatively in local and supralocal affairs for the benefit of the community.

The concern for transculturation is observed in changes such as the way the Pemón dress (specifically the young), the devaluing of traditions, adoptions of new recreational activities while traditional games and typical dances are being lost, use of money (instead of trade) for commerce, dependency on currency for travel, goods, and services, introduction of new languages such as Spanish, English, and German (the latter two for tourism-related jobs), and changes in religion (a move from polytheism to monotheism).

The Kamaracoto recognize that formal education prepares people to be better leaders. Nonetheless, there is less transfer of knowledge from parents to children as well as less contact between them because the formal educational system requires children to spend more time in school and less time working and learning from parents in daily subsistence activities. According to the group discussion, the mission and the Venezuelan education system (partly a responsibility of the mission) are linked to changes in religion, emphasis on "western" education, and changes in the transfer of traditional knowledge from generation to generation.

The problems that the community faces are much more complex than before and require leaders with more capacity not only to understand and resolve local problems, but to also understand and deal with supralocal issues that affect the community. The community and the “capitanes” are perceived to be apathetic toward the problems and lacking the will to try to solve them. Likewise, the group feels that there is no alternative source of leadership to turn to for orientation or solutions (from within or outside the community).

With all these changes in community structure and character, the Kamaracoto feel that there will be more division of the community. This, they believe, will cause the Pemón culture to disappear (or at least diffuse or acculturate), and young people will be forced to migrate, leaving the communities more susceptible to political parties and outsider manipulation.

## Visitors

According to the group discussion, visitors (kairan, pachi, or karanton) come to the Valley to visit an environment that they don't know. Visitors are important to the Kamaracoto in several respects: they bring hard currency and medicines into the community, some contribute (via anthropological studies) to the better understanding of the Pemón culture, and visitors represent a potential source of cultural exchange.

Among the changes that the Kamaracoto have observed are the increase of visitors to the Valley not only by plane but also by the Acanán river (that connects the Valley to Angel Falls and to Canaima) and through an old path from Kavanayén across the mountain range to the east of the Valley. Visitors are known to come mainly for nature tourism, to visit the Kavak and Uruyen savanna, to explore the Auyantepuy's canyons, climb the Auyantepuy, or in the case of cinema enterprises, to film movies (including pornographic videos). The group attributed the increase in tourist visitation to the activity of foreign enterprises that not only promote ecotourism to the area, but also bring tourists themselves. There is also a perceived increase in tourism attractions, routes, and circuits that have diversified the tourism product in the Kamarata Valley. Another reason given for the increase in visitation is the growth in the number of local tourism entrepreneurs (“microempresas”) which have changed from one to eight in the last 5 years, establishing contract arrangements with outside tour operators. The Kamaracoto believe that there are very few services for tourists, they lack effective community organization for tourism, and have very little control over who visits, when they visit, and where they go.

This increase in visitors is perceived to have brought several consequences. On one side, more work opportunities have opened up (especially for young locals) with the need for infrastructure construction, motor boat operators, maintenance services, tour guides, cooking, and wait staff. The possibilities of greater income creates, in turn, opportunities for the community to invest in other priority areas such as health, education, and transportation. The Kamaracoto know that increases in visitation will require more services and infrastructure.

On the problem side, the attitude is that the influx of visitors has brought pollution to the area in the form of

trash (locally there is limited means to dispose of it properly); many young Kamaracoto tend to abandon school and the family conucos to look for job opportunities in tourism; and many Kamaracoto believe that racial mixing between locals and visitors is an undesirable outcome that can threaten the community and its cultural values. Finally, the community has seen and experienced the beginnings of fragmentation as the local tourism “microempresas” compete for tourists.

## Conclusions

Participatory Rural Appraisal proved to be both an assertive approach to foster participation and an effective methodology to learn about important social, cultural, and subsistence values attributed by the Pemón Kamaracoto to environmental elements (forest, tepuyes, animals, waterfalls, savannas, minerals) and economic activities (shifting cultivation, tourism, and mining) in the Kamarata Valley. Through this approach, we have found that changes in the conucos (location, number, size, and patterns of exploitation), depletion of many essential forest and savanna resources, and the migration or depletion of game animals and fish are attributed by the Kamaracoto to the following factors: (a) population growth; (b) changes in population behavior, evidenced by the acquisition of new values and need for cash (for outside goods and services), adoption of new lifestyles which are themselves reflected in the acquisition of commodities (such as motorboats, firearms, bicycles), and changes in traditional practices of fishing, hunting, use of fire, and transportation; (c) opening of new market opportunities to sell conuco products, arts, crafts, and pottery (commerce and tourism); and (d) increase in labor and material requirements of the tourism business due to increased tourist visitation, infrastructure, and other tourism-related activities and services.

In addition, the intervention of the mission, the government education system and programs, the emergence of new political leaders and economic groups (tourism “microempresas,” local stores, and groups linked to political parties), and internal friction of the settlements have brought transculturation and internal competition, which in turn has affected the community's social organization and leads to fragmentation. Nevertheless, the alleged cases of corruption, debts, and misallocation of resources that have surrounded the tourism association seem to be more the result of a lack of training in business management, coupled with competition among local microempresas and uneven and unfair business relations with outside tour operators than actual corruption. These allegations also come from the perception that the association receives large amounts of revenues and that the community has not received its share of benefits as expected when community members were asked to participate with their labor, knowledge, food, and materials in the development of the Kavak camp.

Tourism in the Kamarata Valley is mainly a product of its history, the creation of the Park, the promotion of the area both by outsiders (gold diggers, bush pilots, explorers, missionaries, researchers, resource managers, tourism entrepreneurs, and film makers) and, to a lesser extent, by locals. Tourism in the valley has changed from being something inevitable to being a desired economic option for the

Kamaracoto, who perceive tourism as a more desirable economic activity than mining because it is more profitable (given that minerals are scarce). Furthermore, tourism is favored over mining because it is less devastating both socially and environmentally.

The Valley has become, in the last 16 years, a pole of tourism attraction in Canaima National Park due to its natural monuments, cultural beauty, and the variety of tourism products and experiences it offers (sightseeing, hiking, climbing, fluvial excursions, explorations, research, and so forth). This competitive advantage in relation to other places in the Gran Sabana is very attractive to regional, national, and international tour operators and agencies. As a result, the promotion and access to tourist markets, as well as the development of tours, routes, and circuits are driven and controlled by outsiders. This kind of development within the park creates local dependency since tourism constitutes for them a necessary source of income. Although some local people have actually gone outside the Valley to establish partnerships with tour operators, they still depend on outsiders to have access to tourist markets and other resources. At the same time, they receive a very low percentage of the tourism revenues while absorbing most of the cost of infrastructure development and maintenance of the camps.

Tourism within the Valley is expected to grow in terms of (a) the number of visitors (b) the number of new competing microempresas, and (c) infrastructure development and services. This expected growth and positive attitudes toward tourism has given high expectations to the Kamaracoto that face few economic options within the Park. The combination of these factors will make the communities increasingly dependent on tourism.

The Kamaracoto still maintain a strong subsistence-level relationship with their environment. Their current relative social and cultural stability allows a level of resource relation that guarantees ecological stability (such as the capacity of an ecosystem to return to the original situation, or at least a similar one, after a disturbing event). Nonetheless, the trends that the Kamaracoto observe are beginning to affect their relation with their environment that they believe can have serious implications to their sustainability. The consequences of these trends are amplified by the harsh living conditions and environmental limitations (low productivity of the forest and savanna and scarce resources), as well as the isolation of the area from other population centers.

The Kamaracoto have linked tourism to all the significant elements in the Valley. They realize that the industry is generating direct changes and catalyzing other ongoing ones. As tourism slowly becomes central to Kamaracoto economic activity and as it continues to have an impact on the social organization and lifestyle of the Kamaracoto, we will certainly observe major changes to the subsistence economy of the settlements and with the community structure and culture.

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# Wilderness, Tourism Development, and Sustainability: Wilderness Attitudes and Place Ethics

Jarkko Saarinen

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**Abstract**—Wilderness areas are considered to represent one of the last vestiges of the past, untouched by the modern world. In many respects, however, this is no longer true: wilderness areas have been explored, converted into administrative units and, in some cases, promoted as products or as sites of production and consumption. This is most clearly in evidence in connection with forestry and the world's largest and fastest growing industry, tourism. This paper examines attitudes toward wilderness areas and the conflicts arising in the relations between forestry, nature conservation, and tourism in the Koilliskaira (Saariselkä) region of Finnish Lapland.

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Wilderness is a strong and powerful word. For most people it conjures up distinct images, the content of which is dependent on the cultural environment in which those persons are living and their personal history and experiences. The word covers many meanings, so it is quite understandable that different objectives and values, often mutually contradictory ones, are connected with the use of wilderness. Both conceptually and as an arena for social action, wildernesses can be said to represent a combination of highly diverse elements that would be impossible to discuss exhaustively here. The aim of this paper is rather to outline the essential dimensions of the concept and to discuss our attitudes toward wilderness and its use. The concept of wilderness is perceived here above all as a value-bound, ethically loaded one, a locus for the examination of questions concerned with the regulation of land use (such as nature conservation, forestry, tourism). Our notion of wilderness as a place and its character reflects our relation to it and the types of activities that we consider acceptable in wilderness.

## Wilderness—a Word with Multiple Meanings

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### Objective, Subjective, and Cultural Notions of Wilderness

It is difficult to find any consistent definition for the concept of wilderness, for, as with concepts as a whole, its

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definitions tend to vary with time and from one person and culture to another at the same point in time (Burks 1994; Linkola 1985; Nash 1967; Short 1991). An attempt has, nevertheless, been made in law and in connection with various agreements to establish an “objective”—uncontested—concept of wilderness.

The Finnish Wilderness Committee, for example, defined the basic characteristics of wilderness areas as follows (Erämaakomitean mietintö 1988: 23):

1. A wilderness area should comprise a minimum of 15,000 ha and usually be more than 10 km in width.
2. The area should be ecologically as diverse as possible...and all human action should be adjusted to nature so as not to spoil the wilderness character of the area.
3. The area should as a rule have no roads.
4. The landscape should be in a natural state condition and unspoiled. Any structures connected with human activity should merge with the natural landscape.

On the basis of these characteristics and the Finnish Wilderness Law, enacted in 1991, 12 designated wilderness areas were established in Northern Finland to safeguard their wilderness characteristics and to provide for the preservation of local cultural features (Sami culture), the pursuance of natural sources of livelihood, and diversified utilization of the natural environment. In the latter sense, the Law allows small-scale forestry to be practiced, for example, and also reindeer herding, which is characteristic of Sami culture.

In the United States, the minimum size for an official wilderness area, as described in the Wilderness Act of 1964, is 2,020 ha, and their basic characteristics are that they should be in a natural state, have no roads, and contain a natural fauna. Wilderness is a place “...where man himself is a visitor who does not remain” (Public Law 1964). The corresponding minimum size in Australia is 25,000 ha and in Sweden 50,000 ha (Erämaakomitean mietintö 1988).

These definitions emphasize the spatial and visual features of wilderness areas, which are outlined, delimited, and listed on the basis of their concrete, observable properties. In this way wilderness areas are defined objectively, as scientifically demonstrable units that can be “weighed and measured” (Keat 1997).

But how does the objective definition of wilderness correspond to the understanding of individual people? The notions held by the latter can be approached from an “experiential” perspective by examining the feelings aroused by a wilderness. Thus, we are dealing with wildernesses in a subjective sense, so that the memories and feelings of individuals combine with their concrete observations to create the experience of a wilderness. According to Tuan (1974: 112), it is impossible to define wilderness in an

objective manner, but rather it receives its definition by way of being a state of mind (Hallikainen 1993; Karjalainen 1995). Unlike the case of an objective definition, we are now operating (consciously) within the sphere of human values, which are difficult to measure.

In a subjective sense, wilderness does not exist without a subject, an observer, who experiences it. On the other hand, wildernesses and wilderness experiences can be said to be conceptualized through human feelings and meaning relations shaped by more extensive cultural and socio-historical processes. In this case, we are dealing with wildernesses in a cultural sense, in which we set out to describe and introduce wilderness and examine the types of meaning and value structures that are associated with it. In a cultural sense, wilderness is textual in nature, for example, it can be read, interpreted, and connected with other texts and their meaning structures quite differently by different cultures and social groups.

The very term wilderness can be interpreted through its cultural and historical framework. According to Nash (1967: 1-2), this Anglo-American term is composed of two root words, “wild” and “deor.” In etymological terms, the word means a place that is inhabited by wild beasts and that is beyond the sphere of human control. Short (1991: 6), however, maintains that it may be derived from the Old English words “wæld” or “weald” denoting a forest. Since in the Central European farming tradition the forest was regarded as a place inhabited by beasts and evil spirits (Sepänmaa 1986: 121), the etymological meaning of the word wilderness can be delimited by this route, too, as applying to a place or an area beyond human action and culture. Unlike its Anglo-American equivalent, however, the Finnish compound word “erämaa,” used in the legislation referred to above, for example, receives historically its meaning through hunting and fishing culture (Hallikainen 1993; Lehtinen 1990, 1991). The first part of the compound, “erä,” is an ancient Finnish word that apparently denoted a distinct area subjected to some degree of “administration” that was important for the hunting and trapping rights of distant wilderness regions. Thus, the Finnish Wilderness Law still assigns some role to the local culture and economy in the preservation of wilderness areas.

In this sense, the Anglo-American wilderness concept has emerged more or less by conquering the wilderness—as an opposite to culture, while the traditional Finnish “erämaa” has been defined by living in and with it. But, this traditional idea of wilderness is presently contested by modernization and globalization of Finnish society. Thus in practice, the relations between the objective, subjective, and cultural definitions of wilderness, to be discussed in more detail, are by no means free of problems in any cultural context or time, and it must be stated straight away that despite the attempts to produce a definition that is free from all preconceived values, even the objectively defined concept of wilderness still reflects the subjective and cultural values and attitudes that we entertain with respect to wilderness and its use.

## Attitudes Toward Wilderness

Juhani Pietarinen (1987) distinguishes four basic attitudes of man toward the forest environment, utilism, humanism, mysticism and primitivism (biocentrism), which will be applied below to the concept of wilderness (table 1). The most common of these is utilism, denoting, according to Pietarinen (1987: 323), “purely conceived notions of utility.” The approach underlines the unrestricted right of man to exploit the natural environment, and maintains that any excessive exploitation can be compensated for through ever-advancing technological innovations. Humanism, in turn, maintains that the natural environment should promote human development in a variety of ways, not only as a source of raw materials, but also as a means toward attaining ethical, aesthetic, and mental equilibrium. Mysticism perceives man as part of a more extensive entity formed by nature, and searches for an experiential unity between man, the natural, and the divine. The fourth basic attitude, primitivism, or biocentrism, represents an approach in terms of values that clearly recognize and insist on the inherent worth of the natural environment, maintaining that man has no special rights to exploit nature and that human well-being should not rest on a foundation that causes damage to nature (Vilkkä 1995).

How are the above wilderness concepts, attitudes, and related ways of utilizing nature reflected in our relations to

**Table 1**—Four attitudes toward wilderness areas (partly after Pietarinen 1987).

	Objective	Justification	Wilderness image
Utilism	High standards of social and human well-being by increasing production.	Unrestricted right of man to exploit wilderness areas to promote his well-being and production.	A source of fuels and raw materials.
Humanism	Human perfection and mental balance.	Unrestricted right of man to exploit the wilderness to promote his perfection.	A valuable opportunity that man should develop through his own action.
Mysticism	Unity of man and nature.	The highest value of human life is to aim at the sacred state embodied in unspoiled nature.	Basically a large spiritual entity.
Biocentrism	Safeguarding the inherent value and functions of wilderness areas.	All species are equally valuable—man has no special position.	A total ecological system with an inherent value of its own.

wilderness? This will be discussed with respect to use of a region that comprises the wilderness of Koilliskaira, the present-day Urho Kekkonen National Park and the Saariselkä tourist area, a region that will also be referred to simply as Saariselkä, and the contradictions associated with this exploitation.

## Case Study: Koilliskaira—the Last Wilderness in Europe?

### Forestry and Nature Conservation

Koilliskaira and the Saariselkä tourism region are located in North-Eastern Lapland (fig. 1), and were effectively introduced to the general public in the late 1950's and early 1960's through conservation debate, and novelist Kullervo Kemppinen, whose books "Lumikuru" (The Snow Gully), 1958, and "Poropolku kutsuu" (The Call of the Reindeer Path), 1962, painted a sublime picture of the wilderness character of Saariselkä and its special features (Saarinen 1998). The region consequently became known as the "hikers' paradise," and the effect of these books was seen directly in the numbers of tourists. While the average annual increase of visitors in the 1950's was under 40 percent, in the year following the publication of the book "Lumikuru," the number of hikers doubled, and this vigorous expansion continued into the 1960's (Saastamoinen 1982).

At the same time, however, the increased timber needs of the wood-processing industries in the north forced the Forest Service to plan fellings in the Saariselkä region, for which purpose a dense network of forest roads were planned. In response to this, the Finnish Tourist Association; the hiking and skiing organization, Suomen Latu; and the Finnish Nature Conservation Association made an initiative in 1961 that the Saariselkä should be protected from all fellings and that it should be preserved as a roadless tract of wilderness. Later, in 1967, the Finnish Nature Conservation Association proposed that the whole of Koilliskaira should be preserved in this way, comprising an uninterrupted area of some 5,000 km<sup>2</sup>. Other corresponding proposals and demands were made, but it was decades

before these led to any concrete results, despite the lively discussions that centered around issues of forestry, conservation, and tourism (Saarinen 1996a). The resulting publicity in media raised Koilliskaira to a position of national significance as one of the last extensive wilderness areas in Europe (Häyrinen 1979, 1989). Following this long period of dispute, the area was finally protected in 1980 under the name of the Urho Kekkonen National Park (2,550 km<sup>2</sup>), the law to this effect coming into force in 1983.

The creation of a National Park failed to halt the polemic over the economic exploitation of the Saariselkä, however. A previous example of this is the disagreement that emerged over the costs of protecting the last old virgin forests in Finland in 1995. It was claimed in one major study that much more profit could be obtained from felling the forests of Saariselkä region than could be made from nature conservation and tourism (Pohjois-Suomen ja Pohjois-Karjalan... 1995). It was calculated in the study that the total yield per hectare from the economic exploitation of the old forests for which protection orders were pending would be three times greater than that achieved through tourism and conservation, and that the employment effects of exploitation would likewise exceed those of the latter policy three-fold.

Whatever the situation in the calculations and reality may be, the above events, such as the history of the establishment of the National Park and the debate over the costs of conservation, were both characterized by the fact that tourism and nature conservation were linked closely together to form one alternative policy. It would seem in the light of this example that a certain synergy exists between use of the natural environment for tourism and its protection, so that no significant contradiction was perceived between nature conservation and the development of tourism, at least at the initial stage, perhaps even the reverse (Borg 1992; Budowski 1977; Saastamoinen and Kajala 1995). In the case of Saariselkä, it was believed that the promotion of tourism could save the region from the threat of fellings.

The plans that were made for the economic use of the Saariselkä region represent the traditional, utilitarian approach to wilderness, in which the natural environment is regarded as a source of numerous raw materials, whether it be squirrel pelts or timber for pulp production. Arguments of this kind are supported by objectivizing the wilderness only in terms of cubic meters of timber, jobs, and sums of money, for example, it is not regarded as possessing a value in itself. The utilitarian viewpoint as a whole is characterized by an attempt to break loose from the bondage of human values and keep to objective "facts."

In connection with the establishment of a National Park, tourism and nature conservation can be regarded as representing mainly a humanistic attitude toward the wilderness, and as far as hiking is concerned, also a mystic relation to nature, for the motives for this often involve experiencing the natural environment as sacred and seeking unity with it (Kemppinen 1958; Thoreau 1955). Indeed, the basic humanistic approach holds that man should make use of technology to ensure that nature can be used more fully as a means of promoting the edifying objectives of humanism. This is what National Parks are in a sense all about; the provision of overnight huts, log walkways, campfire sites, and bridges, for example, may be seen as an attempt to give almost everyone a chance to reach and explore an "untouched"

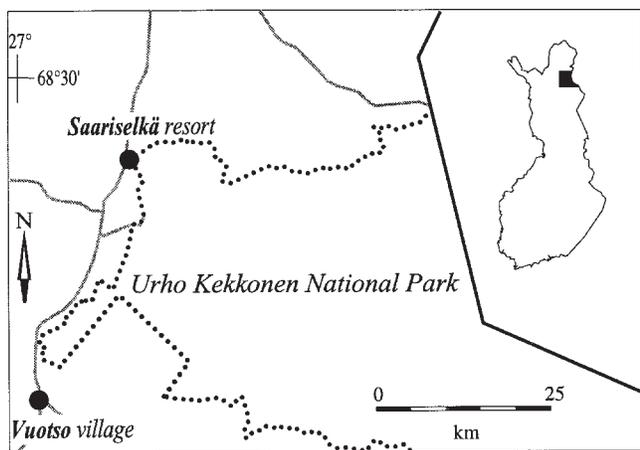


Figure 1—Saariselkä region: the case study area.

natural environment. Stretches of wilderness offer aesthetic, ethical, and educational experiences at both the individual level and at that of humanity as a whole (Martin and Inglis 1983) and thus play both a subjective and a cultural role. Humanism does not attempt to break loose from the human values attached to wilderness but rather makes a conscious effort to emphasize the instrumental character of the “non-material” values attached to them.

Tourism also has a reverse side, however, in addition to the humanistic one. There is no great ideological difference between an institutionalized tourist industry and any other form of industry, in that the former is devoted to exploiting the natural environment under the same terms of a market economy, and often to the maximal possible extent (Harvey 1996; Relph 1976; Shaw and Williams 1994). It is at this point, of course, that nature conservation has to opt out of the tourist industry and the “touristization” of wilderness. But as far as conservation issues and their relations to forestry are concerned, tourism often offers a basis for arguments that have been difficult to formulate on nature conservation grounds alone, providing an opportunity to point out the economic benefits of conservation in the form of jobs and income. For example, the aforementioned estimated economic benefits of forestry in the Saariselkä region were based on a time period of 25 years. After that period of heavy exploitation, forestry would not provide significant real income for the next 150 to 170 years. Conservation, accompanied by nature-based tourism, would provide benefits over this entire period. In the long run, conservation and tourism would be more profitable in terms of income and jobs (Power 1996a,b; Saarinen 1996a).

As noted earlier, tourism has its dark side too, and there has been much criticism in the last few years of the utilitarian picture of nature projected by tourism in Finnish Lapland. Attempts have been made to steer tourism practices in an environmentally more sustainable direction. Internationally, the tourist industry has reacted to this in part by introducing nature tourism and ecotourism, for example, and these are currently the fastest growing fields of tourism as a whole, representing as they do both utilitarian and also humanistic underlying attitudes (Cater 1994). Nature conservation occupies a prominent position in ecotourism in particular (Boo 1990). In the last few years, the tourist trade as a whole has aimed at complying with the notions of sustainable development, at least in principle (Hunter and Green 1995; Nash 1996).

## Nature Conservation and Tourism

As the ecological effects of tourism and the amount of related information that is available have increased, nature conservationists have been progressively more outspoken in their stand against it. Criticism has been focused at mass tourism in particular, though it is also increasingly being brought to bear on small-scale nature excursions and ecotourism, despite the beneficial effects that may be connected with these. In the end, tourism and its many forms are considered to represent a process that is constantly demanding and conquering new, unspoiled areas for its own use, and “wilderness tourism” is becoming more popular in Western societies (Butler 1991; Eagles 1995: 29). An uncompromising stance toward the protection of nature and wilderness areas represents a basic biocentric attitude

grounded in the notion of the natural environment as a value in its own right. In principle, this view approves the status of man as a part of nature, but in practice it maintains that man in the end exploits the environment to satisfy his own needs, either utilitarian or humanistic (Vilkka 1995). The biocentric view is that there should be natural areas where no trace of human activity can be seen (even with the help of locks and chains where necessary), a view defended by the wilderness protection enthusiasts.

Although tourism in Saariselkä today and the attraction of the region are largely an outcome of the founding of the National Park, there are many questions surrounding tourism, its sustainability and development, and its consequences. In addition, tourism is undergoing continuous change and development, which is another factor giving rise to contradictions with other forms of land use, and even problems within the tourism industry itself.

Tourism has expanded rapidly in Saariselkä up until the last few years in terms of both the number of visitors and the construction of an infrastructure of tourist services. Where the accommodation capacity of the area in 1960 was some 200 beds, with slightly over 1,000 accommodation days, the figures had increased to some 6,500 and almost 200,000, respectively, by 1995 (Saarinen 1997; Saastamoinen 1972). The most recent general plan for the region allows for a further increase in capacity to some 20,000 beds (Saariselän yleiskaava... 1993), which will undoubtedly mean major changes in both the physical environment and the images and motives associated with tourism and wilderness recreation in Saariselkä.

From the point of view of the tourists themselves, there will be a question about the meanings that they currently attach to Saariselkä as a destination and the way in which any increase in accommodation capacity and the related development that occurs will change these meaning structures. The development of tourism in the region has already converted some of the local nature-based attraction factors into touristic products, such as downhill skiing and snowmobile safaris. Has this progress influenced the basic motives for tourists coming to Saariselkä?

In objective terms, Saariselkä can no longer be regarded as a wilderness, of course, but the results of a survey conducted there in 1994-1995 ( $n = 1,276$ ) suggest that the most important motives for Finnish tourists going there are the natural landscapes and stretches of wilderness, and an opportunity to enjoy peace and quiet (Saarinen 1996b). This image is also underlined and exploited in the marketing of the area (Saarinen 1997, 1998). At the image level, such as subjectively and culturally, Saariselkä would thus still seem to stand out as a place that allows the visitor to come face to face with wilderness and gain experiences of it.

All of the arguments and decisions connected with development of tourism and nature conservation nevertheless rest almost entirely on the objective concept of a wilderness, and this entails ethical problems in larger scale. An attempt has been made to protect the natural environment and the wilderness character of Saariselkä in places where these have been in line with prevailing notions of what constitutes a valuable natural environment. At the same time, this has in a sense offered a right and justification for treating all places outside these protected areas as one likes, without any ethical pangs of conscience over the resulting impoverishment

or disappearance of species, or damage to the landscape (Shephard 1977). Thus, the development of tourism in the Saariselkä outside the boundaries of the established National Park has been, and is, guided mainly by the regulatory mechanisms of the market economy such as competition between resorts and the availability of capital, and not by ethical questions connected with the preservation of the natural and cultural landscape. In addition to the approximately 14,000 extra beds planned for the tourism region at Saariselkä, services in the area may in the near future include sports and motor sports areas, gold panning, husky and reindeer sled routes, and increased numbers of hiking, skiing, and snowmobile routes (Saariselän liikunta- ja virkistyspalvelut... 1995).

These planned functions will have a strong effect on the larger region, on nature, and on local communities. They will affect the National Park, too. They are even to some extent inconsistent with the existing tourist services available at the region; and most of all, from the point of view of the tourism industry, they conflict with the basic motives that bring tourists to Saariselkä year after year, often several times a year. This raises the question of whether Saariselkä can still maintain its image as “the last wilderness in Europe,” which was created by media and conservation debate in the 1960’s and 1970’s, and which is still used in tourism advertising. In any case, who can be expected to visit the place if it loses its subjective and cultural character of wilderness? If the landscape changes in a manner that disturbs the tourists, it ceases to be wilderness even in their imaginations, and they lose the opportunity to experience peace and quiet there. One can hardly expect the present tourists to continue patronizing it. Thus, the protection of wilderness character of the Saariselkä is not only an ecological issue, but also a question of social and economic sustainability of the tourism industry itself.

## Conclusions

It is presumably impossible to demonstrate “objectively” beyond dispute which concept of wilderness or attitude toward wilderness is more correct than the others when discussing our notions of such areas and their use—each has advantages, justifications, and drawbacks of its own. Although the various viewpoints and attitudes help us to organize our thoughts and possibly to identify the factors and objections lying behind our own notions of wilderness and those of others, they do not as such offer any solution to the contradictions connected with the use of wilderness. It is not enough to perceive that actors possess different concepts, or that they basically have a utilitarian or biocentric attitude, for example, and thus to assume, albeit justifiably, that their values are contradictory ones. These concepts and perspectives become practical tools only when we focus our attention on a given place (wilderness) and the related social and cultural framework, for by doing so we will be able to emphasize contextuality and the ethical viewpoints related to that place.

As we shift the focus of the investigation from a general, abstract level to a concrete geographical place, we can be said to be moving from “nowhere” to “somewhere,” as Sack (1992) puts it. This paper did not discuss the relationship between nonlocal and local wilderness concepts, attitudes, and uses. That doesn’t mean that it wouldn’t be important:

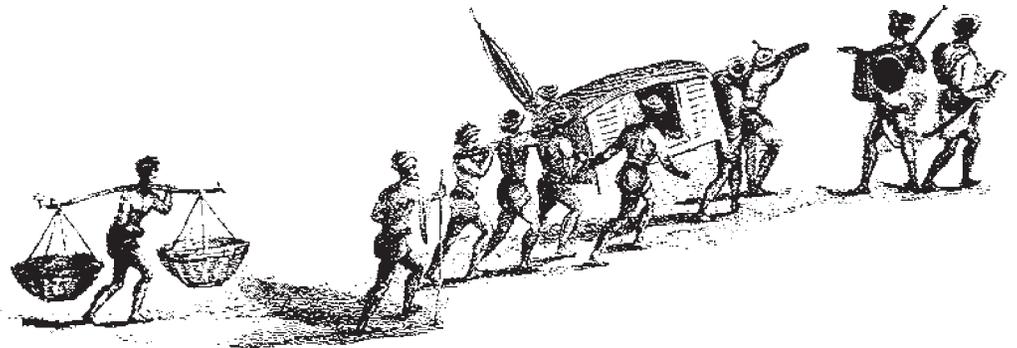
whether it is a matter of the future of wilderness areas or of old virgin forests in Finland (and elsewhere, I believe), the discussion should focus on somewhere, on existing social and cultural systems. Consideration of the effects of decisions on local social systems and people provides an opportunity to anticipate their magnitude at the level of communities, families, and individuals as well, and thus to target possible compensation measures of conservation in a more just and sustainable manner. The western notion of wilderness as a place where man is only a visitor should not be taken for granted as the only legitimate wilderness definition in areas inhabited by indigenous peoples such as the Sami (Faulstich 1994; Mohawk 1992). In the end, the successful protection of wilderness areas is not so much a question of ecological model solutions and their correct application, as of measures by which protection can be provided in a manner that is sustainable culturally, socially, and with respect to the local community. This social sustainability can be seen as binding on tourism in particular, as it often exploits the natural environment setting out mainly from nonlocal values and from utilitarian viewpoints, thus marginalizing the rights of the local people to their land and culture.

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### III. Understanding and Protecting Biodiversity





# Participatory Biodiversity Management and the Concept of Mini-Sanctuaries

Shaju Thomas  
Aby P. Varghese  
Jayan Nandan Nair

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**Abstract**—A 1 year study (1994-1995), inventorying and monitoring biodiversity of the Western Ghats, initiated by Professor Madhav Gadgil, Indian Institute of Science, Bangalore, India, brings out the conservation potential of Chelamala, so far scientifically unexplored and unrecognized. It shows how landscape modification over the years led to the local extinction of flora and fauna. It also describes the success of an initiative for biodiversity conservation through the interaction of academia, activists, local people, and government. Based on the study, an attempt has been made to revive the idea of “Sacred Groves” into present day realities as Mini-Sanctuaries.

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This paper is not an attempt to deal with the paradigm conflicts or methodological problems in conservation efforts, but is an effort to describe how awareness can lead to action and participation by local people for biodiversity conservation. What is required is proper initiative and stewardship of someone from the locality or from outside. If the initiative is from outside, recognition of local expertise and an understanding of, and camaraderie with, the community is an essential element for the success of the initiative. Conservation programs in countries with an expanding population base will be futile if we ignore the human component in such programs.

The best way to achieve global efforts for biodiversity conservation is local action involving academia, activists, and the local community. Gadgil and Guha (1995) outlined a pragmatic approach for biodiversity conservation by giving incentives or by sharing benefits from the conservation efforts with the local community. Kothari and others (1996) discussed in detail how tribal communities can be motivated to be active partners in conservation. Pushpangadan and Nair (1997) suggested strategies for biodiversity conservation through the Panchayat Raj institutions. But considering the evolving socio-cultural patterns and economic realities, a broad-based and area-specific approach to conservation is needed.

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Here, we wish to record the success story of a small initiative in the right path as envisioned by Professor Madhav Gadgil of the Centre for Ecological Sciences, Indian Institute of Science, Bangalore, for conservation of the biodiversity of the Western Ghats (Gadgil 1993, 1996). The present paper is an outcome of the involvement of the authors in Professor Gadgil's program for inventorying and monitoring biodiversity of the Western Ghats.

## Methodology

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The methodology followed for inventorying and monitoring biodiversity was the one designed by Professor Gadgil, his colleagues, and the participants of the program (Daniels and others 1994). Consistent with the “landscape approach” used in the program, each participating team selected a 25 square km area rich in landscape elements and diversity in a part of the Western Ghats accessible to each team. The first step was to identify the various landscape elements to prepare a landscape map. The map thus prepared was compared with false color composite satellite imagery and ground truth was ascertained. An investigation of landscape history was carried out to understand the changes in biodiversity in that area over the years. It was primarily based on previous toposheets, government and forest department records, settlement registers, written and oral history, and interviews with elders of the locality.

The area selected for this study falls in latitude 10°5' through 10°10' N and longitude 76°45' E (fig. 1). The Periyar, the largest river in the state, flows from east to west along the middle of the study area. A major part of the study area was a typical lowland forest but was modified to a great extent due to human intervention. Now it consists of *Tectona grandis* (Teak) and *Ailanthus malabarica* (Perumaram) plantations (years of planting 1942 to 1952), a patch of moist deciduous forest, and an emerging evergreen area (locally known as Chelamala >50 ha), all owned by the state forest department and surrounded by human settlements. It belongs to Keerampara panchayat of Kothamangalam taluk in Ernakulam district and known as Punnaekkadu (the southern bank of Periyar) and Thattekkadu (the northern bank), respectively. Thattekkadu is a protected area where the famous Salim Ali Bird Sanctuary is located.

We concentrated our study in a 5 square km area of the selected 25 square km area on the left (southern) bank of the Periyar. We prepared a landscape map after identifying the various landscape elements in the area and established 600 m long transects in selected landscape elements. Quadrats of 10 x 10 m were established on either side of the transects with an interquadrat distance of 40 m, as suggested by Daniels and others (1994). Floristic studies were based on the fixed transects and quadrats. For fauna, in

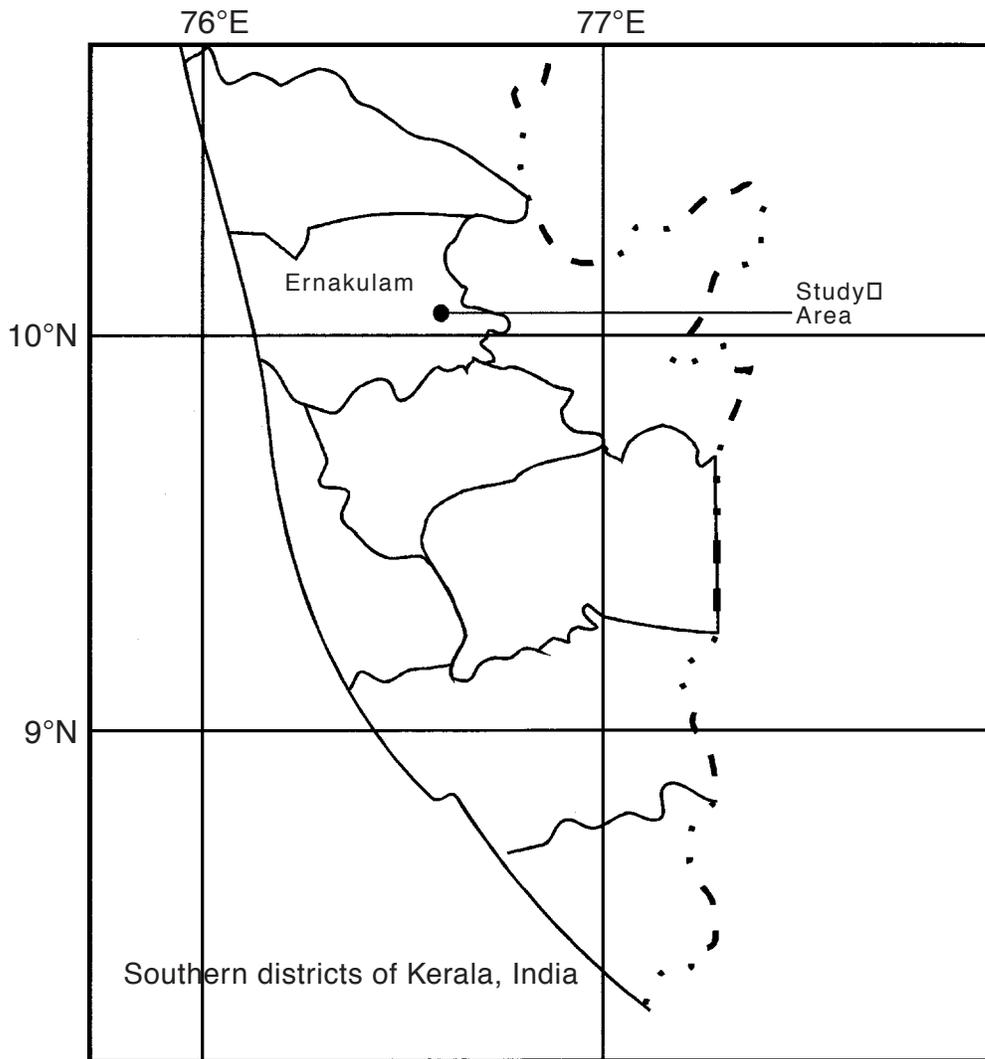


Figure 1—The study area in Ernakulam district of Kerala.

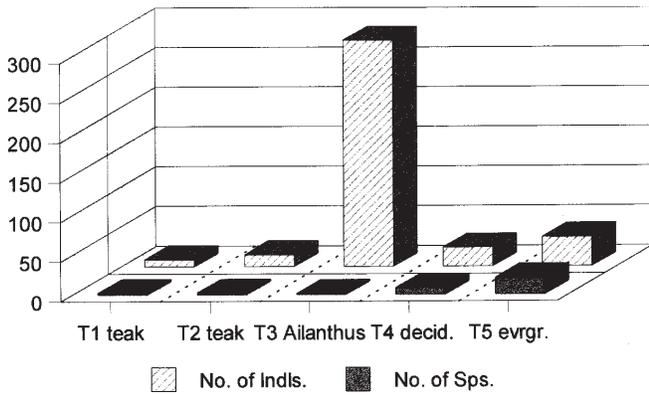
addition to regular observations through the transects, periodic field visits and random observations were carried out. The period of study was from December 1994 to November 1995.

Before initiating the study, through our interaction with the student community and activists from the area, we identified a few people from the area who have concern for the environment and who are knowledgeable of local flora and fauna. We organized our study team to represent all interest groups. It consisted of four students from the area, two students from outside, two local people, and two consultants (one for flora and the other one for fauna). The local people participated in our work whenever we requested their help or when they had free time to join us. In addition to sharing the joy of group work, they were paid for their time. Moreover, several people actively helped in our field work as a gesture of involvement and concern. As the area falls within the jurisdiction of the State Forest Department, department staff were very helpful, and Professor Gadgil supported our study in all possible ways.

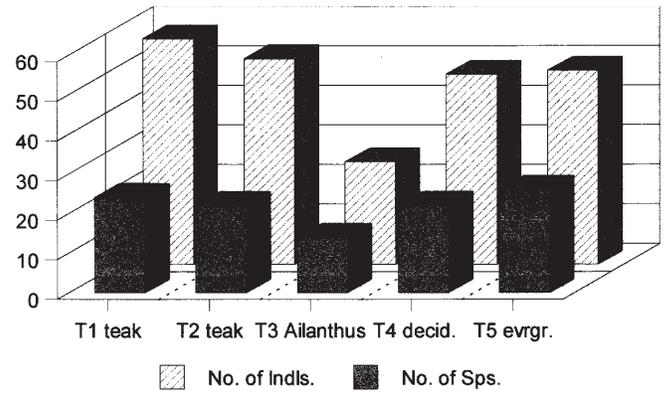
## Results and Discussion

We established five transects and 60 quadrats in the different landscape elements of the 5 square km area to study the flora and fauna during the 1 year period. Transect number-1 (T.1) was on the southwest part in the teak plantation near Kalappara. Transect-2 (T.2) was laid south-east to Kalappara, also in the teak plantation. Transect-3 (T.3) was in the *Ailanthus* plantation east of Kalappara surrounded by human settlements on three sides. Transect-4 (T.4) was within the moist deciduous forest at the foothills of Chelamala. Transect-5 (T.5) was laid at the northern slope from east to west in the regenerating evergreen forest of Chelamala. The altitude of the locations of these transects varied from 50 to 100 m above m.s.l. (mean seal level).

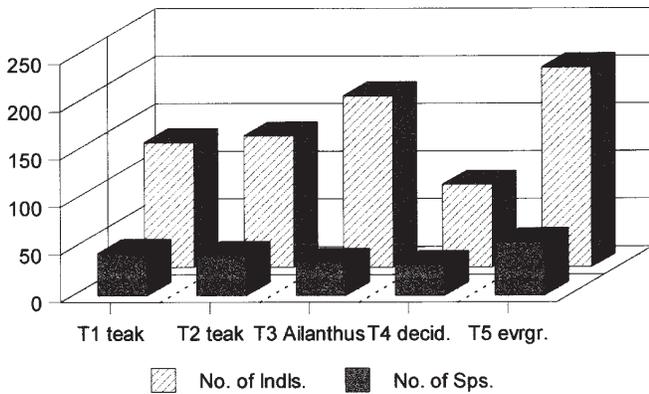
Figures 2 through 5 show the variation in number of species and number of individuals of each species that we encountered during the period of study through the specified transects.



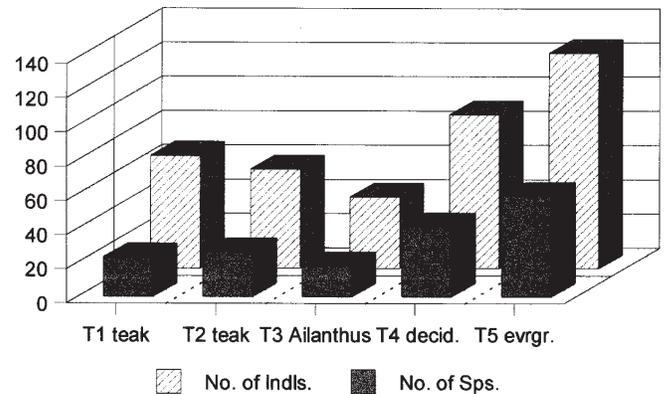
**Figure 2**—Number of species and individuals of trees along the five transects in different landscape elements.



**Figure 4**—Number of species and individuals of birds along the five transects in different landscape elements.



**Figure 3**—Number of species and individuals of nontree plant species along the five transects in different landscape elements.



**Figure 5**—Number of species and individuals of butterflies along the five transects in different landscape elements.

Tree species diversity is highest in the moist deciduous forest and in the emerging evergreen. As the plantations are monocultures and under silviculture practices, tree species diversity is very low. But in the case of non-tree plant species, the plantations showed at least as much diversity as the moist deciduous and evergreen forest.

Regarding birds, the teak plantations supported more species and a higher number of individuals than the *Ailanthus* plantation and moist deciduous forest. This may be due to the increased food availability, especially insects, for many birds from the teak plantation community. The emerging evergreen is richer in avifauna, as it corresponds to the plant diversity. In the case of butterflies, the plantations are least diverse compared to the forest patches.

In the emerging evergreen of Chelamala, we came across a wide variety of plants and invertebrates, several species of amphibians, 14 species of reptiles that include *Varanus* and *Python*, and 112 species of birds. We observed 11 species of mammals including a slender loris (*Loris tardigradus*) that is regarded as a threatened species. Our study clearly indicated that the Chelamala region is “bio-rich,” despite its small size and isolation from the contiguous forest. The people in the locality utilize this area for collecting medicinal

plants, firewood, green manure, and for experiencing wilderness. But the tragedy in the drama, as observed by Gadgil and Guha (1995), was the lack of awareness and interest by the Forest Department in either understanding diversity or protecting it.

## Landscape History and Current Status of Chelamala

During the last 100 years, the Chelamala region enjoyed or suffered severe human disturbances and underwent several modifications (Department of Forest 1948; Ittan 1971; Ward and Conner 1863). It is believed that Chelamala was the summer abode of Cheraman Perumal (A.D. 700 to 800), one of the kings of the Chera Kingdom. There is an interesting account of “elephants being used for ploughing the region for rice cultivation.” Later this area came under the control of Thrikkariur Karthas (the local administrators) from whom people leased land for cultivation.

Definitely, this area underwent several phases of shifting cultivation, locally known as ‘Malamkrishi’ or ‘Viruppu’.

"The clearing was carried out from December to June, seeds were sown in June, and the crop was harvested in September-October" (Bourdillion 1892). Though shifting cultivation was banned in 1870, large-scale extraction of timber was carried out from this locality during the latter half of the 19th century to meet the colonial hunger for quality timber. As a result of the continuous extraction of teak from the forest, its numbers dwindled, which compelled the administrators to plant teak after clear-felling the forest. This activity started in 1865 in the Malayattur forest division (Pillai 1919) to which the study area belonged. After initial failures, the program later became a success.

In the Punnaekkadu region, the Forest Department started planting teak in 1942. Before that, according to their records, it was a typical moist deciduous forest. But during our interaction with local people, we came across families who had settled there before 1925, and according to their account, Chelamala was an evergreen forest. The old settlers conducted 'Malamkrishi', hunted animals, and utilized forest resources for their livelihood. They used more than 15 varieties of paddy for cultivation, none of which is now available. After the abolition of 'virippu' by the enactment of law, sugarcane, lemon-grass, and 'tankia' cultivation was carried out in this area. Hence, our reasonable guess is that once Chelamala was a typical evergreen patch, which was clear-felled in due course, experienced different types of cultivation, and finally came under the custody of the Forest Department. They tried plantation activity, but it failed and the patch started regenerating in its own way.

Elders still remember that during the early 1920's elephants roamed the study area. According to local people the other major animals that underwent local extinction as a result of landscape modification are:

1. Leopard (*Panthera pardus*)
2. Sambar (*Cervus unicolor*)
3. Nilgiri langur (*Presbytis johnii*)
4. Giant squirrel (*Ratufa indica*)
5. Great Indian hornbill (*Buceros bicornis*)
6. Crocodile (*Crocodylus* sp.)

Also, an array of plants (such as *Terminalia chebula*, *Vitex negundo*, *Coscinium fenestratum*) are believed to have gone locally extinct.

Several of the landscapes have local names, which have their roots either in a biological or a cultural setting. For example, 'Kalappara' means where people piled up paddy grains after harvesting 'virippu'. 'Punnaekkadu' derives from punna (*Callophylum inophyllum*) and Kadu (forest), and 'Chelamala' means 'completely canopy-covered hill'. Whatever be the past landscape and history of extinction in this region, we now have an opportunity to keep a bit of it for posterity.

## Conclusions

The study for inventorying and monitoring the biodiversity of a 5 square km area at Punnaekkadu of the Western Ghats showed that variation in flora and fauna are related to the nature of the landscape element. Biologically, the plantations are least diverse compared to natural or disturbed forest. Observations of landscape modifications over the

years show that habitat alterations have had detrimental effects on flora and fauna and led to local extinction. People have exploited biodiversity in their surroundings for subsistence and are aware of its value.

Our effort to understand the biodiversity of the region has revealed that it still harbors rich floral and faunal diversity, unnoticed and unrecognized by the paid guardians of forest resources. The local people are concerned with the conservation potential and value of this piece of land, and now they are taking the lead to pressure the authorities to bring this area into the conservation network. They have prioritized this area for conservation and ecotourism in their developmental objectives for the 9th Five Year Plan (Developmental Framework, Keerampara gramapanchayat, 1996).

We propose that this area be declared a minisanctuary and that the people have a stake in its protection. This can be equated and conceptualized with the practice of the age-old sacred-grove tradition (Gadgil and Vartak 1976; Unnikrishnan 1996) once prevalent in Indian life. Thus, we can bring back a lost wisdom (lost due to cultural misunderstanding and ecological illiteracy) that is as relevant today as it was in the past for protecting the scattered biodiversity-rich patches in private and public holdings, which act as refuge for several species of flora and fauna without obvious value to society. Many such small lands are scattered throughout Kerala. They can be conserved if a proper initiative and interaction emanates either from individuals or from institutions and their administrators. The Chelamala region must be protected as a minisanctuary with local participation. If protected, it will remain as an island of natural forest on the southern bank of the Periyar River in Ernakulam district and would act as a buffer for the Salim Ali Bird Sanctuary, Thattekkadu.

## Acknowledgments

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# Study of Plant Species Diversity in the West Siberian Arctic

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**Abstract**—The West Siberian Arctic, due to its history and physiography, is characterized by a simple biotope (habitat) structure and low species richness. By analyzing full vegetative species inventories in specific localities, comparisons of floras of different biotopes (such as partial floras), and identification of the roles of individual species across the landscape, our research revealed subzonal changes in the structure of plant species diversity. Though general taxonomic diversity decreases from the southern hypoarctic tundra to the arctic tundra subzone, the number of species in partial floras does not decrease significantly. There was an increase in ecological amplitudes (mainly of arctic and arctic/alpine species) in the majority of habitats. The ratio of geographical groups differs greatly between subzones: hypoarctic and boreal species prevail in the southern subzone; arctic and arctic/alpine species replace them in arctic tundra.

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The West Siberian Arctic (Yamal, Tazovsky, Gydansky Peninsulas) is an inaccessible and sparsely populated (5 people per 100 km<sup>2</sup>) area of 235,000 km<sup>2</sup>. It has attracted attention as an area of conflict between fragile arctic ecosystems, traditional land use by indigenous nenetz people (overgrazing of lichen pastures, exhaustion of hunting resources), and oil and gas extraction activities. According to reports by Vilchek and Bykova (1992), approximately 0.1 percent of land in Yamal is severely disturbed. Due to its history and physiography, the region is characterized by a simple biotope structure and low species richness (about 400 vascular plant species) and can be a good model for the study of zonal trends in biodiversity. This research was based on full species inventories, comparisons of floras of different biotopes, and identification of the role of each species in the landscape (species activity) to allow an understanding of zonal changes in biodiversity.

## Study Area

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The West Siberian Arctic is a part of the West Siberian plain with average elevations of 30 to 40 meters a.s.l., numerous creek and river valleys and ravines, widespread mires, and a great number of lakes. Bedrock is not exposed

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anywhere; the territory is covered by a thick (up to 300 meters) layer of Quaternary deposits, formed by alternating clay, clayey, and sandy layers (Sisko 1977). The study area lies within the zone of continuous permafrost, where seasonal freeze-thaw processes and cryogenic natural disturbances (thermokarst, solifluction, streambank erosion, landslides) occur.

The climate is continental and rather severe. The absence of weather stations in the study area forced us to use the nearest data to characterize climatic conditions (table 1). Average July temperatures range from 11 degrees centigrade in the south to 4 degrees centigrade in the north. Average January temperatures range from minus 25 degrees centigrade in the south to minus 27 degrees centigrade in the north; the average low temperature is minus 29 to 30 degrees centigrade, while the absolute low is about minus 50 degrees centigrade. Strong winds are common. Precipitation decreases from south to north. The flatness of the terrain and great latitudinal range (from the Arctic Circle to about 74° N) lead to clear subzonal differences attributable to the reaction of the flora to summer warmth. Positive temperatures occur from June to September. Phenological autumn comes during the second half of August with a sharp decrease in day length and the first frosts. Though positive temperatures occur in September, the growing season is over by then. The length of the growing season is constant at approximately 3.5 months across the study area, whereas the cumulative degree days above zero and above 5 degrees centigrade almost double from north to south. Each subzone is characterized by the sum of daily mean temperatures above 5 degrees centigrade that exerts strong influences on flora and vegetation. The boundaries of botanical-geographic subzones in the region correlate with summer month isotherms. Thus, the southern boundary of the arctic tundra subzone in the West Siberian Arctic roughly coincides with the 5 degree centigrade isotherm of July (roughly 71° N), whereas, in Taimyr it lies farther north (roughly 73° N), but also correlates with a 5 degree centigrade isotherm.

## Methods

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Floras of eight geographical localities, or "local floras" (Yurtsev 1987), were studied in the north of West Siberia during the field seasons of 1983 through 1991: four of them were situated in the southern hypoarctic tundra, and four in the arctic tundra (table 2; fig. 1). In this paper, we use the floristic subdivision of the tundra zone suggested by Yurtsev (1994). In the West Siberian Arctic, these boundaries coincide with the limits of botanical-geographic subzones of southern or shrub tundra and arctic tundra proposed by Gorodkov (1935).

**Table 1**—Temperature and precipitation measures in different subzones of the West Siberian Arctic and adjacent regions (compiled from: Petrov 1973).

Subzone	Meteorological station	Mean summer months temperature °C				Mean annual t °C	Summs of daily mean temperatures		Precipitation (mm)
		<i>VI</i>	<i>VII</i>	<i>VIII</i>	<i>IX</i>		<i>&gt;0</i>	<i>&gt;5</i>	
Southern hypoarctic tundra	Korotaikha (Bolshezemelskaya Tundra)	+4.3	+10.2	+8.7	4.3	-6.6	624	499	350
Southern hypoarctic tundra	Mys Kamenny (Yamal)	+0.7	+8.1	+10.1	+5.0	-9.4	758	668	353
Southern hypoarctic tundra	Kresty (Taimyr)	+3.4	+11.4	+8.6	+1.5	-12.3	730	432	344
Arctic tundra	Kharasavei (Yamal)	+0.7	+5.5	+5.7	+2.3	-9.6	460	289	296
Arctic tundra	Tambei (Yamal)	+1.0	+5.5	+6.4	+2.3	-10.6	493	344	301
Arctic tundra	Belyi Island (Yamal)	-0.3	+4.1	+5.3	+1.9	-10.4	372	160	258
Arctic tundra	Dikson Island (Taimyr)	+0.1	+4.6	+5.0	+1.3	-11.5	392	112	274

The basis of our field work was the method of “concrete floras” (Tolmatchev 1974). At each locality, all habitats were searched until no new species were found in similar habitats within 10 km. At four sites (Laiyakha, Poilovayakha, Khonorasale, and Matyisale), a detailed study of intralandscape structure of plant species diversity was conducted. Based on similarity in slope position, snow regime, surface moisture, soil composition, and especially similarity in vegetation, we classified habitats into different habitat types. The list of vascular plant species from each habitat type is considered its “partial flora” (Yurtsev 1987). Species typical of a partial flora form its “floristic core” and are of major importance for the characteristic of the partial flora. Species are divided into 2 categories: (1) “specific elements,” which only occur in certain habitat types and are species that are diagnostic of a habitat type, including constant and faithful species, and faithful but rare ones; and, (2) “nonspecific elements” or “active species,” which are regularly found in different habitat types (Khitun 1989).

## Results and Discussion

### Taxonomic Diversity

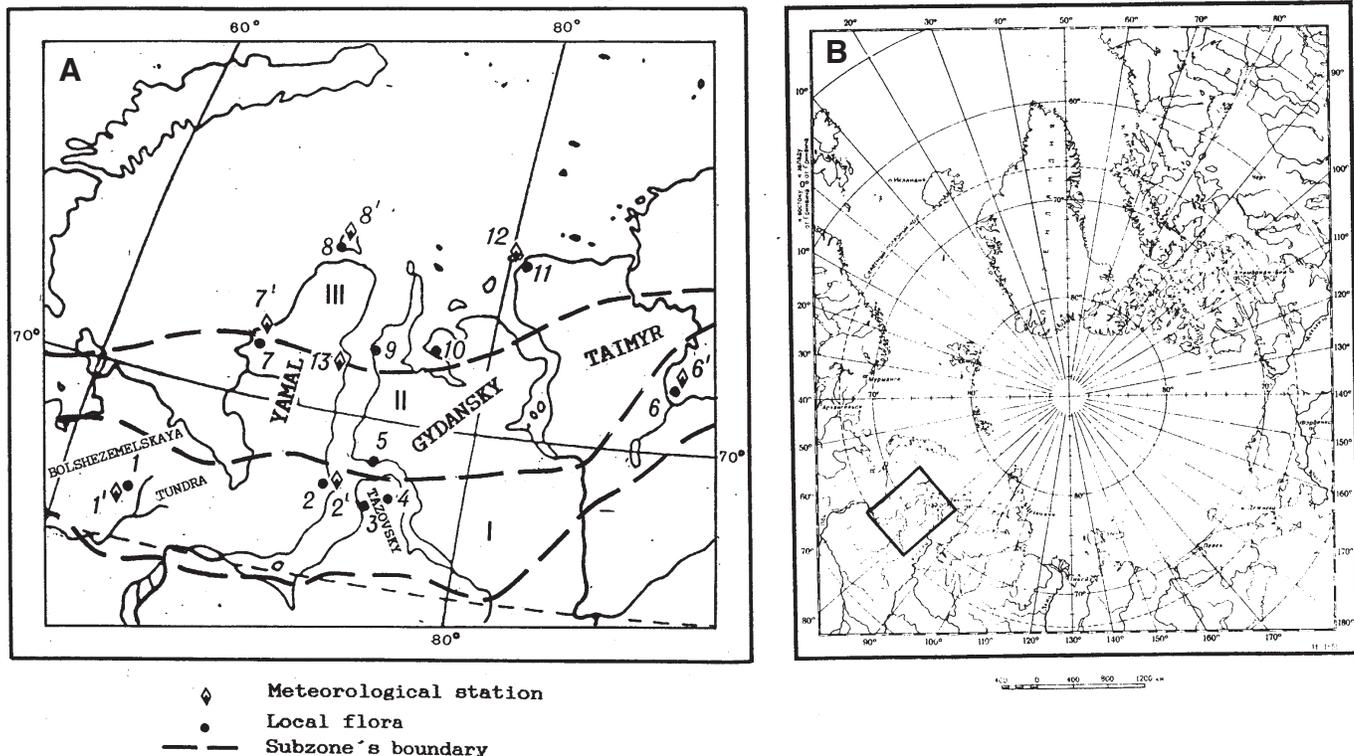
The West Siberian Arctic is known for its floristic poverty. Total vascular plant species richness is 358 for Yamal (Rebristaya 1990), 273 for Tazovsky (Rebristaya and others

1989), about 400 for Gydan (Khitun and Rebristaya 1998), and about 460 for the whole Yamal-Gydan region, according to “The Arctic Flora of the U.S.S.R.” (1961-1987). Floras of adjacent territories are richer in species number: 475 in Bolshezemelskaya Tundra (Rebristaya 1977), 650 in Taimyr (“The Arctic Flora of the U.S.S.R.” 1961-1987). The paucity of species in the West Siberian floras may be explained by the geological youth of the area: its Quaternary history was characterized by alternation of sea transgressions and regressions, when the terrain was uninhabited by plants from adjacent mainland (Sisko 1977). Alternatively, lack of relief, lack of some soil types (such as calcareous), and widespread peaty, poorly drained, acid soils (pH about 4.0-4.5), which are not suitable for many arctic species, also decrease species richness.

As is shown in table 2, the floras of the southern hypoarctic tundra are richer than the arctic tundra to the north. Of the southern hypoarctic tundra flora, the “Khevesyo” local flora of Yamal is the poorest, while local floras of Tazovsky and Gydansky are richer, as is the “Nyamdoyu” of the Bolshezemelskaya Tundra. The Taimyr flora “Kresty” is located more northerly but is richer (241 spp.) than most of the West Siberian ones. For the West Siberian local floras in the southern hypoarctic tundra subzone, large participation of the Cyperaceae family, poor presence of the Caryophyllaceae (compared to Taimyr), absence of Saxifragaceae (and in some floras Brassicaceae), and presence of Rosaceae among the ten largest families are characteristic

**Table 2**—Location and taxonomic diversity of studied West Siberian local floras and local floras of adjacent regions

Local flora	Region	Subzone	Coordinates		Number of			Author
			N.L.	E.L.	Species	Genera	Families	
Nyamdoyu	Bolshezemelskaya Tundra	Southern hypoarctic tundra	68° 14'	62° 38'	210	113	42	Rebristaya 1977
Khevesyo	Yamal	Southern hypoarctic tundra	68° 35'	73° 20'	187	92	38	Khitun and Rebristaya 1998
Laiyakha	Tazovsky	Southern hypoarctic tundra	68° 08'	74° 50'	215	98	42	Rebristaya and others 1989
Poilovayakha	Tazovsky	Southern hypoarctic tundra	68° 15'	76° 25'	187	96	42	Rebristaya and others 1989
Chugoryakha	Gydansky	Southern hypoarctic tundra	69° 07'	74° 40'	210	97	42	Rebristaya and Khitun 1994
Kresty	Taimyr	Southern hypoarctic tundra	70° 50'	89° 45'	241	111	44	Matveeva and Zanolka 1986
Kharasavei	Yamal	Arctic tundra	71° 10'	67° 10'	125	63	27	Rebristaya (unpubl.)
Belyi Island	Yamal	Arctic tundra	73° 15'	71° 30'	75	34	16	Rebristaya 1995
Khonorasale	Gydansky	Arctic tundra	71° 25'	73° 10'	174	75	30	Khitun and Rebristaya 1998
Matyuisale	Gydansky	Arctic tundra	71° 56'	76° 32'	152	63	27	Khitun and Rebristaya 1998
Dikson	Taimyr	Arctic tundra	73° 30'	80° 35'	138	66	25	Matveeva and Zanolka 1997



**Figure 1**— (A) Location of the local floras studied. 1 = Nyamdoyu, 2 = Khevesyo, 3 = Laiyakha, 4 = Poilovayakha, 5 = Chugoryakha, 6 = Kresty, 7 = Kharasavei, 8 = Belyi Island, 9 = Khonorasale, 10 = Matyuysale, 11 = Dikson; location of meteorological stations mentioned in table 1: 1' = Korotaikha, 2' = Mys Kamenny, 6' = Kresty, 7' = Kharasavei, 8' = Belyi Island, 12 = Dikson Island, 13 = Tambei. The thick dotted lines indicate the borders between subzones (Yurtsev 1994): I = southern hypoarctic tundra; II = northern hypoarctic tundra; III = arctic tundra. (B) Location of study area within the Circumpolar Arctic.

(table 3). Grasses (Poaceae) absolutely prevail in all studied floras. In the arctic tundra subzone in Gydan, as well as in Yamal and in Taimyr, participation of Caryophyllaceae, Brassicaceae, and Saxifragaceae families are very high, but the portion of Cyperaceae in the West Siberian floras remains higher than in Taimyr. The number of families decreased significantly from 42 in the southern hypoarctic tundra to 27 to 30 in the arctic tundra mainly due to disappearance of single-species families. The number of genera also decreased due to the disappearance of single-species genera, whereas in a few genera (*Draba*, *Saxifraga*), the number of species in the arctic tundra increased greatly (from 2 to 3 to 11 to 12). Gydan local floras in the arctic tundra are the richest, while the Belyi Island flora is the poorest of all known floras in this subzone. This could not be explained only by ecotope monotony and severe environments; probably the flora's poverty is connected with the lower rates of species migration to the island (Rebristaya 1995).

Local floras of the West Siberian Arctic are characterized by a high level of similarity: similarity indices range between 75 to 85 percent within a subzone and 55 to 60 percent between subzones (Soerensen-Chekanovsky index was used:  $i = 2C/A+B$ , where A and B are the total number of taxa in two comparing floras and C is the number of shared taxa). Similarity with local floras from adjacent sectors of the Arctic within the same subzone is about 60

percent. Interestingly, arctic Gydan floras have an even higher similarity, with the Taimyr southern flora "Kresty" (about 60 percent), than with the Taimyr arctic flora (45 percent). A few amphioceanic species (*Epilobium alpinum*, *Veronica alpina*, *Gnaphalium supinum*) occurring in Yamal, Tazovsky, and Bolshezemelskaya Tundra are absent in the southern part of Gydan. A large group of arctic-alpine herbs (*Gastrolychnis apetala*, *Androsace triflora*, *Astragalus umbellatus*, *Saxifraga bronchialis*, *Senecio resedifolius*), absent in Yamal, is present in Gydan, as well as in Taimyr and Bolshezemelskaya Tundra. Several species (*Ranunculus monophyllus*, *Pedicularis oederi*, *Arctous alpina*, *Hedysarum arcticum*) that do not spread northward from the subzone of northern hypoarctic tundra in Yamal occur in Gydan in the arctic tundra subzone. On the whole, more than 80 species (such as *Gastrolychnis apetala*, *Carex supina*, *Lychnis sibirica*, *Orthilia obtusata*) are rather rare, sporadically spread Holocene or Pleistocene relics. Two species (*Castilleja arctica*, *Pedicularis hyperborea*) are endemic to the West Siberian sector. Though general taxonomic diversity decreases to the north (187 to 215 species in the southern hypoarctic tundra versus 125 to 174 in the arctic tundra), species richness in partial floras of corresponding habitats does not decrease (table 4) due to a change in species activity and expansion of species with broad ecological amplitudes (mainly arctic and arcto-alpine species) to the majority of biotopes, replacing boreal species.

**Table 3**—Number of species in the leading families in the local floras in the West Siberian Arctic.

Family	Southern hypoarctic tundra				Arctic tundra			Belyi Island
	Khevesyo	Laiyakha	Poilovayakha	Chugoryakha	Kharasavei	Khonorasale	Matyuisale	
Poaceae	27	30	23	33	26	28	22	20
Cyperaceae	13	18	16	14	12	15	16	14
Asteraceae	17	19	16	16	7	14	9	1
Caryophyllaceae	12	14	11	13	12	16	16	7
Scrophulariaceae	12	12	10	13	3	6	6	1
Ranunculaceae	11	11	11	11	9	11	11	7
Salicaceae	11	11	12	11	6	9	8	3
Juncaceae	7	10	7	11	4	5	5	3
Rosaceae	7	10	6	9	6	5	5	3
Brassicaceae	10	5	4	9	11	17	15	7
Ericaceae	7	9	8	5	2	4	2	1
Saxifragaceae	6	6	5	6	6	11	14	6
Polygonaceae	4	5	5	5	5	5	4	2

### Intralandscape Diversity of Local Floras

Biodiversity, according to Whittaker (1965) can be divided into “alpha-diversity”, the diversity of species within habitat; “beta-diversity”, the diversity between different habitats; and “gamma-diversity”, the total diversity of a whole geographically or ecologically defined region. The last is the most important index for the determination of biodiversity because it includes both of the other measures. In general, the chances for greater gamma diversity are better in more heterogeneous environments (Navech 1994). Though we distinguished from 17 to 21 habitat types in each locality studied (table 4), they are small-scale landscape units—microecotopes. In the Arctic, even small differences in relief cause differences in ecological conditions and, hence, in the vegetation. But in the West Siberian Arctic, due to its general flatness and low altitudes, these differences are not so great; therefore, many different landscape positions (such as flat plateaus of watersheds and floodplains) have similar vegetation and, accordingly, high similarity indices.

According to their floristic similarity, habitat types can be joined in 60 certain groups, or classes, of habitats. Their number is restricted to 10 in the southern hypoarctic tundra and six in the arctic tundra. Taking into account that some habitat types are quite rare and sporadically spread, we can conclude that gamma-diversity is very low in this region even compared to other sectors of the Arctic. Partial floras of different habitat types number 12 to 74 species. The average level of similarity between partial floras inside each local flora is 30 to 40 percent in the southern hypoarctic tundra and 50 to 60 percent in the arctic tundra, but maximal coefficients reach 80 percent. Similarity between partial floras of corresponding habitats within a subzone reaches 85 percent, while between subzones it is about 30 percent.

The richest habitats (numbering about 70 species) occur throughout the area on slopes (especially south-facing) and moist foothills, with dwarf-shrub-herbaceous communities or herbaceous meadows. In the southern hypoarctic tundra, a few habitat types are joined based on the presence of high (up to 3 m tall) upright willow or alder shrubs; they, naturally, are absent in the arctic tundra, and instead dwarf-shrub (polar willow, mountain avens)-herbaceous

communities (habitat types 7 and 8) are widespread. The richest habitats also contain the most rare species. Therefore, when considering human land use, they should be of special concern for protection. Zonal habitats are intermediate in species abundance; they become notably richer in the arctic tundra. Oligotrophic habitats—sandy beaches, clayey landslides, wet hollows in polygonal bogs—are among the poorest everywhere in the area and contain many specialized r-strategy species and very specific aquatic habitats. Aquatic habitats are the most species poor; their partial floras differ greatly from all others, but they are very similar in both subzones.

### The Role of Active Species

Active species, representing about 15 percent in southern local floras, contribute from one-fourth to two-thirds of partial floras of different habitat types. Their composition is almost identical in Laiyakha and in Poilovayakha. Hypoarctic shrubs and dwarf-shrubs prevail among them: willows (*Salix glauca*, *S. pulchra*), dwarf-birch (*Betula nana*), and ericoid dwarf-shrubs, along with several graminoids (*Calamagrostis neglecta*, *C. lapponica*, *Carex arctisibirica*). In the arctic tundra, the role of active species increases. Representing about 20 percent of the arctic floras of Gydan, active species contribute up to 75 percent of partial floras (mean = 55 percent). Their composition differs greatly from active species of the southern hypoarctic tundra, but it is alike in both arctic floras. Many arctic-alpine herbs (such as *Alopecurus alpinus*, *Luzula confusa*, *Draba* spp., *Parrya nudicaulis*, *Saxifraga* spp., *Eritrichium villosum*, *Myosotis asiatica*, *Pedicularis oeder*) are among the active species in the arctic tundra.

The highest proportion of specific elements in the southern hypoarctic tundra was recorded on steep slopes, on foothills, in alder thickets, in wet meadows, and in aquatic habitats. Many of these species, which are rare and sporadically spread in the southern hypoarctic tundra, become active in the arctic tundra. For example, *Salix polaris* is restricted to snowbeds in the southern hypoarctic tundra, but in the arctic tundra it occurs in almost all habitat types

**Table 4**—Intralandscape diversity of local floras: habitat types and total amount of species in partial floras (PF), in their floristic core (FC), and number of rare species (R).

Habitat type	Name	Southern hypoarctic tundra						Arctic tundra					
		Laiyakha			Poilovaykha			Khonorasale			Matyuisale		
		PF	FC	R	PF	FC	R	PF	FC	R	PF	FC	R
1	Flat plateaus and gentle slopes of watersheds with zonal communities	51	26	1	31	21	0	48	28	2	60	35	1
2	Convex marginal parts of the flat tops of the hills with frost-boiled tundra	35	23	1	32	22	0	48	23	6	57	32	2
3	Convex, better drained, slightly elevated surfaces on river terraces higher than floodplain level	35	20	0	26	18	0	60	37	3	54	28	1
4	Shallow, poor drained depressions on river terraces and flat bottoms of wide hollows	29	19	0	25	20	1	39	20	0	35	20	0
5	Long gentle foothills	30	22	1	32	21	0	55	32	0	47	25	2
6	Peat high-centered polygons in polygonal bogs	25	18	1	30	23	3	36	25	1	38	20	1
7	Steep sandy short slopes of hills with dwarf-shrub-grass communities	70	41	5	45	31	1	61	30	7	50	29	3
8	Steep, clayey or sandy well-drained slopes of hills or deep ravines with herbaceous meadows	69	51	14	54	38	7	73	49	14	58	35	4
9	Drained parts of floodplain with dwarf-shrub herbaceous communities	55	33	7	41	27	4	33	19	0	37	20	1
10	Sand beaches, sand blow-outs on hills' tops with sparse vegetation	32	20	1	24	21	0	37	23	3	25	15	1
11	Steep sandy failures of active banks of the rivers	—	—	33	16	1	56	28	3	26	14	1	—
12	Alder thickets on convex parts of hills' slopes	40	23	5	45	21	3	—	—	—	—	—	—
13	Alder parkland on river terraces	48	24	2	49	26	1	—	—	—	—	—	—
14	Clayey landslides with pioneer vegetation	36	19	4	42	25	3	56	25	5	40	26	1
15	Old entirely recovered landslides' amphitheatres	56	27	0	—	—	—	39	20	0	—	—	—
16	Little hollows on slopes and foothills with snowbed vegetation	69	41	4	61	40	4	55	27	5	50	28	3
17	Willow copses on concave parts of slopes with up-right <i>S. lanata</i> , <i>S. glauca</i> (up to 2,5 m height)	54	34	7	57	30	4	—	—	—	—	—	—
18	Gentle slopes with low willows (<1 m height in Southern hypoarctic tundra and <15 cm height in Arctic tundra)	42	22	0	31	20	1	57	31	3	60	38	5
19	Wet sedge meadows in lake depressions or in river valleys	52	34	3	32	26	3	37	27	2	37	24	2
20	Wet oligotrophic graminoid-moss hollows in polygonal bogs	20	12	0	16	9	0	28	17	0	22	13	2
21	Tussock heath-moss peaty bogs in river valleys	22	12	4	22	12	2	—	—	—	—	—	—
22	Aquatic habitats	15	13	1	16	14	1	12	12	0	16	13	0
23	Coastal marshes	—	—	—	—	—	—	31	17	11	20	13	5

and is very abundant in many of them; *Alopecurus alpinus* is sporadic on river terraces in the southern hypoarctic tundra but is one of the most widespread species in the arctic tundra, as is *Luzula confusa*, *Myosotis asiatica*, *Saxifraga cernua*, *S. hieracifolia*, *Lagotis minor*, and other species.

## Geographical Structure of Local and Partial Floras

The ratio of geographical groups differs significantly between subzones in both local floras as a whole and in partial floras: hypoarctic and boreal species prevail in partial floras (up to 70 percent) in the southern hypoarctic tundra; arctic-alpine and arctic species replace them in the arctic tundra (fig. 2). In the southern local floras, the hypoarctic fraction represents about 35 percent of the flora, and it contributes up to 60 percent of partial floras in habitats with zonal vegetation (habitat types 1 through 6). Boreal species

occupy an important position in local floras in the southern hypoarctic tundra. They prevail in intrazonal habitats, which are rather widespread in the areas studied. The highest proportions of boreal species (up to 35 to 40 percent of partial floras) were recorded in alder and willow thickets (habitat types 12, 13, 17, and 18), on sandy slopes (habitat type 7), and in wet meadows (habitat type 19). Many are codominants in certain communities (*Calamagrostis langsdorffii*, *Rubus arcticus* in habitat type 12, *Caltha palustris*, *Comarum palustre*, *Menyanthes trifoliata* in habitat type 19). The Arctic fraction is less important both in local floras and in partial floras. The largest proportion of arctic-alpine species (30 percent of the partial flora) was recorded in habitat types 1 and 2. Arctic species prevail in aquatic habitats (habitat type 22), in wet hollows (habitat type 18), and on sands (habitat type 10), but their absolute number is highest on herbaceous slopes (habitat type 8). In the arctic tundra, the arctic fraction prevails in local floras (about 65 to 70 percent) and all partial floras (up to 75 percent). Though the arctic

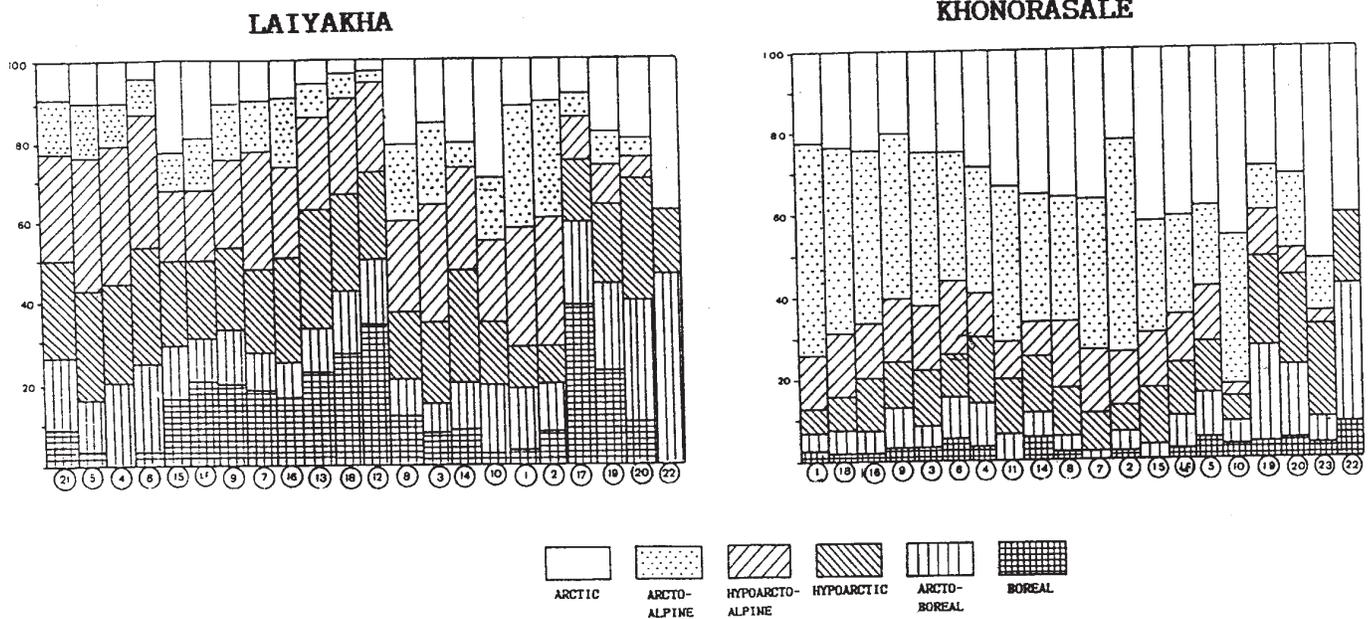


Figure 2—Proportions of geographical elements in partial floras and in local floras on a whole in the southern hypoarctic tundra subzone (left) and in the arctic tundra subzone (right).

element is more prevalent in local floras, in partial floras arctic-alpine species prevail more often. As previously mentioned, many arctic-alpine species narrowly spread in the southern hypoarctic tundra become active and dominant in many habitat types in the arctic tundra. The prevalence of boreal species decreases dramatically in the arctic tundra; their contribution to partial floras of all habitat types is less than 10 percent. The proportion of the hypoarctic fraction also decreases, contributing 25 to 30 percent in all types, except wet ones.

## Conclusions

The West Siberian Arctic is characterized by low ecological heterogeneity and, therefore, low plant species diversity at all levels: alpha-, beta-, and gamma-diversity. Essential similarity in floristic composition between different habitat types is caused partly by monotonous lowland relief and partly by widespread species with broad ecological amplitudes. The relevance of such (active) species increases to the north, and hence, the continuity of floras structure increases, too. The number of species in partial floras of different subzones does not differ, while total species diversity declines in local floras in the arctic tundra. At the same time, species composition of partial floras of corresponding habitats differ greatly between subzones. In the majority of habitat types, only about 30 percent of partial floras remain the same in both subzones, and essential changes in the ratio of geographical elements take place, while partial floras of corresponding habitats within each subzone display high levels of similarity. Hypoarctic and boreal species prevail in

partial floras in the southern hypoarctic tundra; arctic-alpine species replace them in the arctic tundra.

Among species that we refer to as rare, the major portion is formed by arctic species at the southern limit of their range or boreal species at their northern limit. They may be quite common within the main part of their range, so from the circumpolar point of view, they cannot be considered rare. But, taking into account the general poverty of West Siberian floras, we must value the biodiversity contribution of each species. Under conditions of expanding human industrial activities toward the north, in this naturally very unstable and fragile area, we have to struggle for preservation of each of its endemic species. Adventitious species (weeds accompanying people) are still rare in the area, but their expansion is a potential hazard—one that is already being experienced in the vicinities of the oldest settlements in the adjacent regions (Druzhinina and Zharkova 1979). Fortunately, there is still very little human activity in Gydan, while in Yamal, we have already observed the loss of rare species in intensively explored areas near the Bovanenkovo gas field. The problem of conserving rare species is connected with the problem of conservation of species-rich habitats and also rare or unique habitats. Knowledge of their distribution (both rare species and rare habitats) in the region is important for organization of nature reserves or protected areas, and information on the partial floras of biotopes is necessary for successful restoration after technogenic disturbances. Recently, a decree was signed declaring the organization of a new nature reserve in the north part of the Gydansky peninsula. Both of the local floras studied here are within its territory.

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# Asian Ecological Transect: Evaluation of Biodiversity of Soil and Animal Communities in Central Siberia

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**Abstract**—Distribution of invertebrate populations along the Asian Ecological Transect was studied. Attention was paid to Carabidae distribution as the most diverse and numerous taxon. Invertebrate species diversity was correlated with environmental zonality and with landscape profile, poorness or richness of the locality, and the hydrothermic regime of the site. The analyses of Carabidae population distribution along transects on two levels (zonal and landscape) reveal the real centers of biodiversity for this model insect taxon. Parallel with the increasing of Carabidae diversity from the north to the south (meridional transect) are the regional, landscape centers of this taxon diversity. Long-term investigations in the subzone of middle taiga forest in the central part of the Asian Transect has demonstrated that soil invertebrate populations of concrete landscape catena involves 30 to 40 percent of all the fauna of the region.

Changes of climatic parameters from north to south, especially temperature changes, have a great influence on soil biota. This is illustrated through increasing numbers of soil invertebrates, zoomass, and diversity of all animal taxa, including the soil biota (Chernov 1975; Chernov and Penev 1993). In Central Siberia, the greatest diversity of the main soil invertebrate taxa is observed in the South taiga and subtaiga forests. It is characteristic of the Asian Transect that large numbers of invertebrate species are found in several of the most investigated subzones.

Transect studies are often used for investigations of global trends in species diversity (Rybalov and Rossolimo 1995; Whittaker 1970; Wilson and Mohler 1983), as well as studies of soil macrofauna diversity. Studies of animal populations along transects of different scales reveal centers of diversity on the global (longitudinal) level and on regional or landscape levels as well. The transect method provides an opportunity to estimate a-diversity and b-diversity as well and may help reveal changes resulting from global climatic changes or anthropogenic transformation of the landscape.

The Asian Transect (Yenisey River) is one of the most well known ecological transects in the world, where the changes

in the diversity of many organisms have been studied. The soil invertebrate community presents one of the most convenient objects for research of this kind due, in part, to the great abundance of invertebrates in any biocenosis and a great diversity of soil-dwelling taxa. In addition, soil-dwelling animals are good indicators of environmental quality and trends (Rybalov and Rossolimo 1996).

## Material and Methods

### Study Sites

This study was conducted in Central Siberian Russia during seven field seasons from 1985 to 1995, along the middle and lower Yenisey River. Investigations are a part of the Asian Ecological Transect Project. Locations chosen for our study were: Sibiryakov Island (73° N, 80° E), Vorontsovo (71.5° N, 83° E), Karaul (70° N, 83° E), Potapovo (69° N, 86° E), Goroshikha (66° N, 87° E), Bakhta and Mirnoye (62° N, 89° E), Ust'-Pit (59° N, 94° E), and Predivinsk (57° N, 93° E).

The region includes three landscape zones with eight subzones: arctic, typical tundra, southern tundra, forest tundra, northern taiga, middle taiga, and southern taiga, and subtaiga forests. The transect from Sibiryakov Island (73° N, 80° E), at the north, to Predivinsk (57° N, 93° E), at the south spans nearly 2,500 km. In each location, soil communities were sampled on uplands (eluvial elements of the landscape), at transit (midslope) locations, and on accumulative (toe slope) elements, which composed a transect of the second order or landscape-stream order (catena). Applying a catena approach to the animal population reveals centers of diversity of various taxa (Mordkovich and others 1985; Rybalov 1996; Stebaev 1976; Striganova 1996).

In each of the inventoried regions, a minimum of three biocenoses were chosen for investigation: upland, accumulative, and transit parts of the landscape. A large number of sites (15) were explored in the middle stream of the Yenisey River, at the field station Mirnoye. All study locations were situated on the right bank of the Yenisey River.

In each element of the landscape, three or more sites of similar vegetation and soil composition were sampled. At each location eight soil samples of 0.625 cm<sup>2</sup> (25 x 25 cm) were collected and 10 pitfall traps were installed for 10 days.

In a geobotanical description of the studied vegetation communities, dominant species were noticed for each plant layer: A = dominant species in tree layer; B = dominant species in grass or shrub-grass layer; C = dominant species in moss or moss-lichen layer.

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**Sibiryakov Island**—The most northern study location along the Transect, located in a subzone of Arctic tundra.

Element 1. Two sites were studied here. Dwarf shrub-tundra. B - *Salix nummularia* and *Polygonum viviparum*; C - *Alectoria nigricans*, *Pertusaria* sp., and *Cetraria nivalis*.

Element 2. Two sites were studied here. Carex-moss tundra with bleak polygons. B - *Luzula wahlenbergii*, *Luzula confusa*, *Salix reptans*; B - *Polytrichum strictum*, *Aulacomnium turgidum*.

Element 3. Polygon-lichen-moss tundra. B - *Salix nummularia*, *Dryas punctata*; C - *Cetraria cucullata*, *Cetraria tenuipholia*, *Cladonia gracilis*, *Dicranum spadicium*, *Aulacomnium turgidum*, *Polytrichum alpinum*.

**Vorontsovo (Taimir Peninsula)**—Typical tundra subzone.

Element 1. Two sites were studied here. Salix bush tundra. B - *Salix glauca* with *Equisetum arvense* and *Petasites sibiricus*; C - with *Mnium* spp.

Element 2. Moss-Dryas-Equisetum tundra. B - *Dryas octopetala*, *Equisetum arvense*, *Salix polaris*; C - *Tomentypnum nitens* in the moss continuous cover.

Element 3. Two sites were studied here. Moss-lichen and dwarf shrub tundra with bleak polygons. B - *Carex arctisibirica* and *Empetrum nigrum*; C - *Dicranum elongatum* and *Hylcomium splendens* var. *obtusifolium*.

**Karaul (Taimir Peninsula)**—Southern tundra subzone.

Element 1. Salix bush tundra. A - *Salix jenisseensis*; B - *Equisetum arvense*, *Geranium albiflorum*; C - *Mnium* spp.

Element 2. Alnus bush tundra. A - *Alnus fruticosa*; B - *Dryas octopetala*, *Vaccinium vitis-idaea*, *Stellaria graminea*; C - *Hylocomium splendens*.

Element 3. Moss-lichen and dwarf shrub tundra with polygon bleak spots. B - *Vaccinium uliginosum*, *Salix hastata*, *Carex holostoma*; C - *Ptilidium ciliare*, *Dicranum angustum*, *Cladina* spp.

**Potapovo (Taimir Peninsula)**—Situating in transitional subzone - forest tundra.

Element 1. Deciduous mixed forest. A - *Betula tortuosa*; B - *Cirsium heterophyllum* and *Calamagrostis purpurea*.

Element 2. Birch Forest. A - *Betula tortuosa*; B - *Equisetum arvense* and *Mertensia sibirica*.

Element 3. Lichen-moss and dwarf shrub tundra. A - rare *Larix sibirica* and *Alnus fruticosa* trees B - *Vaccinium uliginosum*, *Ledum palustre* and *Empetrum nigrum*; C - *Cladonia* spp.

**Goroshicha**—This study area is situated in the northern taiga subzone.

Element 1. Mixed forest. A - *Picea abies*; B - *Calamagrostis purpurea* and *Cacalia hastata*.

Element 2. Mixed coniferous forest. A - *Picea abies*; B - *Equisetum pratense* and *Vaccinium myrtillus*; C - *Hylocomium splendens*.

Element 3. Coniferous forest. A - *Abies sibirica* and *Picea abies*; B - *Vaccinium myrtillus* and *Equisetum sylvaticum*; C - *Pleurozium schreberi*.

**Mirnoye and Bakhta**—The main region of investigations, situated in middle taiga subzone. During six field seasons 15 types of vegetation communities were investigated.

Element 1. Here three types of vegetation communities were studied, each of them including three sites with similar vegetation and soil composition. It was pure coniferous

forest. A - *Picea abies*; B - *Calamagrostis obtusata*, *Aconitum septentrionale*, *Stellaria bungeana*; C - *Rhytidadelphus triquetrus*.

Element 2. At this area two types of vegetation communities were studied, each of them including three sites with similar vegetation and soil composition. Mixed coniferous forest. A - *Pinus sibirica*; B - *Vaccinium myrtillus* and *Equisetum pratense*; C - *Hylocomium splendens* and *Pleurozium schreberi*.

Element 3. At this location three types of vegetation communities were studied, each of them including three sites with similar vegetation and soil composition. Mixed coniferous forest. A - *Pinus sibirica* and *Abies sibirica*; B - *Vaccinium myrtillus*; C - *Hylocomium splendens* and *Pleurozium schreberi*.

**Ust'-Pit**—Situating in southern taiga subzone of taiga zone.

Element 1. Mixed coniferous forest. A - *Picea abies*; B - *Oxalis acetosella*, *Maianthemum bifolium*.

Element 2. Mixed coniferous forest. A - *Abies sibirica*; B - *Carex macroura*.

Element 3. Mixed coniferous forest. A - *Abies sibirica*; B - *Oxalis acetosella* and *Maianthemum bifolium*; C - *Hylocomium splendens*.

**Predivinsk**—The southernmost region of the studied part of the Transect, situated in the zone of subtaiga forest.

Element 1. Mixed coniferous forest. A - *Picea abies*; B - *Matteucia struthiopteris* and *Stellaria bungeana*.

Element 2. Mixed coniferous forest. A - *Abies sibirica*; B - *Oxalis acetosella* and *Dryopteris linnaeana*; C - *Hylocomium splendens*.

Element 3. Mixed coniferous forest. A - *Pinus sibirica* and *Pinus sylvestris*; B - *Carex macroura* and *Jris ruthenica*.

## Animal Material

Field investigations of the soil invertebrate populations of different biocenoses used standard methods of soil zoological research: hand sorting of soil samples (Gilarov 1975), pitfall traps (Balogh 1958), and sifting of soil and litter (Balogh 1958; Tikhomirova 1975). Carabidae populations were studied in detail. In this region, Carabidae is one of the most numerous, diverse, and well represented in all investigated landscape zones and subzones. It is also significant for the present investigation that the Carabidae fauna of this region had not been studied in detail previously. Scientific data on Carabidae distribution existed only for southern and southeastern regions of Central Siberia (Kryzhanovskij and others 1995; Shilenkov 1987a,b).

The Student's t-test was used in data analysis for comparison of invertebrate population abundance. The Shannon index (H) (Odum 1983) was used to describe taxon diversity.

## Results

### Soil Fauna

Of all the climatic parameters that change from north to south, temperature has the greatest influence on the main characteristics of the soil biota, especially the size of soil invertebrate populations, and the zoomass and diversity of

all taxa of soil biota. The greatest diversity in the main soil invertebrate taxa is observed in the South taiga and subtaiga forests. It is typical of the Asian Transect that a large number of invertebrate species is found in most of the investigated subzones. This is observed for many taxa. For example, myriapods *Monotarsobius curtipes* (Lithobiidae) are present in almost all of the examined subzones. Similar patterns of zonal distribution, from forest tundra to subtaiga forests, are noted for *Angarozonium amurense* (Diplopoda), *Hypnoidus rivularius*, and *Paranomus costalis* (Elateridae) as well as for several species of Carabidae and some other taxa.

The soil macrofauna complexes of arctic tundra are the poorest in the Transect. Soil zoocenoses consist, basically, of Aranei, Staphylinidae, and sarabidae. These taxa include 2 to 3 species. In most communities one species dominates, for example *Pterostichus brevicornis* (Carabidae), and *Tachinus arcticus* (Staphylinidae). In typical tundra, each of these taxa are represented by 3 to 8 species. In southern tundra, in association with *Alnus fruticosa*, the structure of the macrofauna is similar to that of the forest communities, with few boreal invertebrate species.

In all tundra landscapes, the richest invertebrate communities inhabit the transit elements of the landscapes, which are better drained (from 140 ind./m<sup>2</sup> in northern to 400 ind./m<sup>2</sup> in southern tundra). The poorest communities occur in depressions and floodlands, such as in the accumulative parts of landscapes (from 50 ind./m<sup>2</sup> in northern to 120 to 150 ind./m<sup>2</sup> in southern tundra).

In forest tundra, two practically independent types of communities exist—boreal forest and tundra. For example, only in boreal communities, the earthworm *Eisenia atlavinyteae* and the ground-beetle *Pterostichus dilutipes* are numerous. The highest abundance and biomass of invertebrate macrofauna at this site occur in forest communities on valley slopes (up to 500 to 560 ind./m<sup>2</sup>).

In three investigated boreal subzones, we observed a gradual increase of abundance, biomass, and invertebrate species richness from north to south. The highest number and diversity occur in boreal communities on the drained slopes (from 400 to 620 ind./m<sup>2</sup>). Zonal interfluvie (upland) invertebrate community is poorest (from 250 to 350 ind./m<sup>2</sup>). The quantity of species in zonal boreal communities is considerably lower than in intrazonal ones. The highest number of invertebrate species and life forms occur in southern taiga and subtaiga.

## Carabidae

During 8 years of collecting, we found about 150 Carabidae species. This list does not reflect all the diversity of Carabidae in the central part of Middle Siberia along the Yenisey River for several reasons. First is the method of collecting—sorting of soil, pitfall traps, and sifting of litter samples—the soil only; tree-dwelling species are absent. Second is the short time of collecting. Collecting over an entire growing season would produce a list of species several times larger, as could be seen at the central part of the Transect around field station Mirnoye. About 100 species were collected here. But for the aim of our research—to reveal main regularity of zonal and landscape distribution of the modal taxon species—the material is quite enough. The most common Carabidae species and their subzonal distributions are presented in table 1.

Few Carabidae species inhabiting only one landscape zone were registered in our investigations. Tundra and forest tundra species are *Pterostichus pinguidineus*, *P. vermiculosus*, *Carabus odoraus*. South taiga and subtaiga species are *Synuchus vivalis*, *Leistus terminatus*, *Bradycellus glabratus*. Some Carabidae species penetrate through intrazonal habitats to all zones—from typical tundra to subtaiga forests, for example *Elaphrus riparius*. One more peculiarity of Carabidae distribution in this region is significant penetrating along the zonal transect of “northern” species to the south and “southern” species to the north. Typical and numerous northern (arctic, subarctic) species—*Pterostichus brevicornis* and *Curtonotus alpinus*—are found in the middle taiga subzone, and ordinary taiga species are registered in south tundra (*Trechus mordkovichi*) and in typical tundra (*Pterostichus montanus*).

For arctic tundra, the lack of the Carabidae population is characteristic. Only three species were registered. Typically, only a single species dominates. For example, *Pterostichus brevicornis* dominates in most habitats at Sybiryakov Island, and *P. pinguidineus* is dominant at the mainland. The distribution of species across the tundra may be explained by the similar humidity regime across all sites (hyperhumidity). High humidity of all types of tundra soil results from low evaporation and a high level of superfrost in tundra.

Compared with arctic tundra, the diversity of Carabidae species in typical tundra is high—11 species were recorded and seven of them were numerous. Similar to the arctic tundra, numerous species of this subzone occurred at most sites, but preferred only one. For example, *Pterostichus pinguidineus* preferred horsetail tundra on slopes (table 2).

The most abundant and diverse Carabidae community occurs in the sites along streams in the accumulative part of the landscape. In this site, seven of the most numerous species are present. Here the Shannon index is the highest—2.5. At placor and slope associations, population densities and diversity of Carabidae are lower. In these associations, a strong domination of one species was observed - *Notiophilus hyperboreus* at placor associations and *Pterostichus pinguedineus* on the slopes (table 2). This domination by a single species influences the value of the Shannon index (1.4 to 1.6) in both locations; it is lower than in accumulative landscape sites.

In the South tundra subzone, diversity of Carabidae species is higher than in typical tundra. There are 13 species recorded from our collections. *Pterostichus vermiculosus* dominated only in placor moss-lichen tundra. *Diacheila polita* dominated in willow bushes along streams and on lower slopes. The Shannon index value for all slope positions of the southern tundra is reasonably low (H = 1.2 to 1.9), which reflects the domination by a few species in all investigated associations. Carabidae communities of willow-dominated habitats along streams (accumulative element of landscape) are more diverse. The number of Carabidae species of the forest tundra zone is nearly two times higher than that of the south tundra—we collected 30 Carabidae species during two field seasons. Carabidae of the forest tundra have an interesting composition: in this transitional subzone, the community consists of two distinct types: forest and tundra.

Tundra associations are located on placor flat habitats, and forest associations are located at thalwegs and slopes coming to valleys occupied by birch-larch and birch forests.

**Table 1**—Carabidae of Asian Ecological Transect (1988 to 1995).

	Regions of investigations							
	Arctic tundra	Typical tundra	Southern tundra	Forest tundra	Northern taiga	Middle taiga	Southern taiga	Subtaiga forest
	1	2	3	4	5	6	7	8
<i>Pterostichus pinguidineus</i>	6-20	6-20	1		1			
<i>P. brevicornis</i>	2-5	6-20	6-20	2-5	6-20	1		
<i>Curtonotus alpinus</i>		2-5	6-20	6-20	2-5	1	1	
<i>Carabus odoratus</i>			1	2-5	1			
<i>Carabus aeruginosus</i>				1	2-5	6-20	6-20	2-5
<i>Carabus regalis</i>						6-20	6-20	2-5
<i>Carabus henningi</i>						6-20	2-5	2-5
<i>Carabus ermaki</i>					1	2-5	1	
<i>C. canaliculatus</i>							2-5	6-20
<i>P. ehnborgi</i>				6-20	2-5	21-50	21-50	21-50
<i>P. dilutipes</i>				2-5	6-20	6-20	6-20	21-50
<i>P. oblongopunctatus</i>						2-5	2-5	2-5
<i>P. niger</i>						2-5	1	2-5
<i>P. drescheri</i>				1	1	6-20	1	6-20
<i>P. melanarius</i>						1	2-5	
<i>P. blandulus</i>		2-5	1	1	2-5			
<i>P. ochoticus</i>		2-5	1	1	6-20	6-20	6-20	2-5
<i>P. vermiculosus</i>		6-20	6-20	2-5				
<i>P. montanus</i>		2-5	1		2-5	2-5		2-5
<i>P. adstrictus</i>						6-20		1
<i>P. magus</i>					1	6-20	2-5	6-20
<i>Diacheila polita</i>		6-20	6-20	6-20	2-5			
<i>Notiophilus hyperboreus</i>		2-5	2-5	2-5				
<i>N. reitteri</i>			2-5	2-5	2-5	2-5	1	2-5
<i>Amara brunnea</i>				2-5	2-5	2-5	2-5	
<i>Amara communis</i>						2-5	2-5	2-5
<i>Bembidion sibiricum</i>				2-5	2-5	6-20		
<i>Trechus mordkovitshi</i>			2-5	2-5	6-20	2-5	6-20	
<i>Trechus montanus</i>				2-5	2-5	2-5	6-20	6-20
<i>Epaphius secalis</i>						2-5	6-20	21-50
<i>Calathus micropterus</i>					2-5	21-50	21-50	21-50
<i>Synuchus vivalis</i>							6-20	2-5
<i>Loricera pilicornis</i>				1	2-5	2-5	6-20	2-5
<i>Leistus terminatus</i>							21-50	21-50
<i>Elaphrus riparius</i>		1	1	1	1	6-20		
<i>Agonum fuliginosum</i>						2-5	2-5	
<i>A. alpinum</i>				1	1	2-5	1	2-5
<i>Bradycellus glabratus</i>						1	6-20	2-5
<i>Clivina fossor</i>				1		6-20	2-5	2-5

1 = Sibiryakov Island; 2 = Vorontsovo; 3 = Karaul; 4 = Potapova; 5 = Goroshikha; 6 = Mirnoye and Bakhta; 7 = Ust'-Pit; 8 = Predivinsk.

In tundra, ordinary northern species are present: *Pterostichus vermiculosus*, *Diacheila polita*, *Curtonotus alpinus* (table 3).

In the forest, taiga species are numerous and widespread: *Pterostichus ehnborgi*, *Trechus montanus*, *T. mordkovitshi*. Forest and tundra Carabidae populations have few common species. In our collections there is only one such species—*Diacheila polita*. Forest species are slightly more numerous and diverse compared to tundra species. As a whole, this community can be viewed as a poor variant of the northern taiga community. For this subzone, one more feature is distinctive—a high Shannon index in all locations ( $H = 2.15$  to  $2.42$ ). It is logical to suppose that all zoocenoses of this transitional subzone have an ecotonal character, supporting species of more than one region. One of the most diverse associations occurs on the accumulative part of the landscape—birch forest along the streams. The

Shannon index in this association ( $H = 2.23$ ) is one of the highest that we observed. In the ecotone between typical tundra and forest, 12 species were collected and the Shannon index was  $2.42$ .

The Carabidae community of the taiga is more diverse than tundra and forest tundra populations. We collected 37 Carabidae species in northern taiga during two field seasons, 56 species in middle taiga during six field seasons, and 43 species in southern taiga during two field seasons. The number of species appears to depend on the number of field seasons over which material was collected. The comparison of taiga subzone species lists for two field seasons shows that more species are in the southern taiga subzone. Data for each site confirm this. Comparison of analogous landscape elements of different taiga subzones demonstrates that in southern taiga, there were more species than in other subzones.

**Table 2**—Carabidae population in typical tundra (Vorontsovo, June-July 1995) ind. per 100 traps per day.

	Landscape profile elements		
	Elluvial moss-lichen tundra	Transit Equisetum-moss tundra	Accumulative moss-willow tundra
<i>Pterostichus pinguedineus</i>	2	18	5
<i>P. brevicornis</i>	2	6	
<i>P. blandulus</i>	1		6
<i>P. montanus</i>	1		5
<i>Notiophilus hyperboreus</i>	12	2	2
<i>Diacheila polita</i>		2	12
<i>P. vermiculosus</i>			6
<i>Curtonotus alpinus</i>			1
Abundance of Carabidae	18	28	37
Shannon index (H)	1.56	1.43	2.52
Number of species (S)	5	4	7

For Carabidae fauna of the taiga, there is considerable uniformity of species structure despite the vastness of the region of the Asian Megatranssect (more than 1,000 km). The most numerous and usual species occurred in all taiga subzones. On these grounds, one can conclude that there exists a single taiga Central Siberian Yenisey invertebrate species complex.

Not numerous and relatively rare species account for the increase in species richness in middle and southern taiga subzones in comparison with northern taiga. At the same time, populations of northern and southern subzones

have distinctive features. In northern taiga, subarctic species are numerous in many associations, for example, *Pterostichus brevicornis* and *P. blandulus*. In southern taiga associations, south boreal species are numerous: *Leistus terminatus*, *Epaphius secalis*, *Synuchus vivalis*, and *Bradycellus glabratus*.

The distribution of Carabidae populations along the landscape ecological line is similar in all the taiga subzones: the most diverse associations occur on slopes in cedar and cedar-Abies taiga. It is interesting to note that in the same associations in all three subzones, the highest levels of

**Table 3**—Carabidae population in forest tundra (Potapovo, August 1994) ind. per 100 trap per day.

	Elements of landscape profile			
	Elluvial moss-lichen tundra	Transit birch herbs forest	Accumulative birch-grass forest	Ecotone forest tundra
<i>Curtonotus alpinus</i>	2			
<i>Pterostichus vermiculosus</i>	2			
<i>P. cancellatus</i>	2			
<i>Carabus truncaticollis</i>	1			
<i>Diacheila polita</i>	5	1		
<i>Agonum quinquepunctatum</i>	1			
<i>Carabus aeruginosus</i>		1	1	1
<i>P. brevicornis</i>		2	1	3
<i>P. ehnborgi</i>		6	10	6
<i>Trechus mordkovitshi</i>		3	16	5
<i>Pelophila borealis</i>			1	
<i>Patrobus septentrionis</i>			1	
<i>Notiophilus reitteri</i>		1		2
<i>Amara brunnea</i>		1		1
<i>Clivina fossor</i>			1	1
<i>Loricera pilicornis</i>			1	
<i>Bembidion aeruginosum</i>			1	
<i>B. sibiricum</i>				1
<i>Trechus montanus</i>		2	3	1
<i>P. dilutipes</i>				1
<i>B. bipunctatum</i>				1
<i>B. (Plataphodes) sp.</i>				1
Abundance of Carabidae	13	11	36	24
Shannon index (H)	2.35	2.15	2.3373	2.42

biomass of all soil mesofauna were noted. The most diverse sites in the taiga zone are in the spruce forests along streams, where there were more than 10 species collected, and the Shannon index was 2.75 to 3.3. Appreciable annual changes in the composition of dominant species occurred at these sites.

Placor zonal taiga associations (as are taiga associations on slopes) are poorer than spruce associations along streams. Species richness here is nearly half that of accumulative elements. Also, strong domination of one or two species was observed. The consequence of these two phenomena is a low value for the Shannon index ( $H = -1.6$  to  $2.0$ ) in this association. In all three subzones the most numerous Carabidae species at placor and transit parts of the landscape is the same—*Pterostichus dilutipes*. A single species shares dominance in each subzone: *P. brevicornis* in northern taiga, *P. montanus* in middle taiga, and *P. ehnerbergi* in southern taiga. In comparison with Carabidae population of spruce forest along the streams, species composition in taiga upland and slope associations is more constant from year to year.

The Carabidae fauna of the subtaiga is one of the most diverse along the investigated transect—during only one field season we collected 46 Carabidae species. Composition of Carabidae communities of the subtaiga zone are very similar to that of taiga in particular, the most numerous species are the same as in southern taiga.

Nevertheless there are some distinctions. First, in upland and transit forests of the subtaiga zone, large species of genus *Carabus* play a relatively big role. In the taiga zone, species of this genus are distributed mostly in accumulative landscape elements: eutrophic swamps, spruce forests along streams, and floodland forests. Second, some species in this southern part of the transect are more numerous in comparison with the southern taiga, for example, *Carabus cancellatus*, *Pterostichus magus*, and *Epaphius secalis*. Third, some species found in subtaiga forests possess biotopical distribution different from more northern taiga regions (Bei-Bienko 1966). For example, *Pterostichus magus*, collected in middle and southern taiga only in floodlands or in swampy forests, prefers dark coniferous forests on uplands in the subtaiga zone. Very similar changes in habitat preference are observed for *Carabus henningi* and *C. aeruginosus*.

The landscape structure of Carabidae communities in the subtaiga zone was also similar to that of the taiga zone. The largest number of species and the highest value of the Shannon index ( $H = 3.14$ ) was observed in rich spruce forests along streams. But subtaiga associations on upland and transit elements of the landscape were more diverse than at analogous sites in the taiga (number of species 8 to 9,  $H = 2.3$  to  $2.7$ ).

## Conclusions

The analyses of Carabidae community composition along zonal and landscape transects suggest the existence of centers of biodiversity of this model insect taxon. Along with the increase in Carabidae diversity from the north to the south (meridional transect), there appear to be regional, landscape centers of diversity for this taxon. In the northern regions, differences in Carabidae diversity along the landscape profile is minimal because of the influence of permafrost on the moisture regime. In the majority of zones, the most diverse communities occupy accumulative

elements of this landscape profile—catena. To a great degree, this pattern is expressed in the taiga zone, where the number of species in the accumulative elements of the landscape is twice that of other parts of landscape. Most high values of the Shannon index are also observed in the accumulative elements of the landscape. In the transitional subzone, forest tundra, two centers of regional diversity are clear—the first is in accumulative elements of the landscape (in the region of our investigations it is birch forest along streams), and the second center of diversity is the ecotone between forest and tundra. The lowest indices of Carabidae community diversity occur in transit elements of the landscape where indices of quantity and zoomass of the soil invertebrates reach their highest levels.

Long-term investigations in the middle taiga of the central part of the Asian Transect demonstrate that the soil invertebrate community of concrete landscape catena involves 30 to 40 percent of all the fauna of the region.

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# Siberian White Crane on Protected Territories of Yakutia (Russian Northeast)

N. I. Germogenov

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**Abstract**—The importance of existing protected territories of the Sakha Republic (Yakutia) to the conservation of the rare Siberian white crane is evaluated based on range structure and new estimates of the white crane's eastern population in northeastern Russia. The protection of the Siberian crane's population is mostly carried out within 13 territories, occupying 8,934.5 km<sup>2</sup> or 2.6 percent of the Sakha Republic's area. Three of these territories are the Kytalyk Resource Reserve (16,080 km<sup>2</sup>), the Chaygurino (23,756 km<sup>2</sup>), and the Khroma (1,130 km<sup>2</sup>). Reservations are the sites of nesting and summering of more than 720 birds, or 37 to 43.7 percent of the eastern population. Various aspects of practical and research activity related to the development and optimization of the population are examined.

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Conservation of the white crane (*Grus leucogeranus*), a globally imperiled species, is determined principally by the condition of its eastern population. The breeding area and main summer habitat of this population are subarctic tundra, forest tundra, and northern taiga in a vast system of lake depressions in northeastern Yakutia. To various degrees, the birds are found in the northern part of the territory, in the area between the Yana and Omoloy Rivers, to the Kolyma River's left bank—and in the southern part, in the Indigirka and Kolyma River basins up to the Momsky Range's northern spurs. The basic habitat area in Yakutia makes up between 220,000 to 300,000 km<sup>2</sup>. The main part of the nesting population is concentrated in the northern half of this area—in tundra and in forest tundra, which makes up 130,000 km<sup>2</sup> (Flint and Kisshchinsky 1975). According to recent investigations, the area of the population's regular habitat (no more than 82,000 km<sup>2</sup>) is composed of three isolated centers of increased bird density: Khromsky, 10,300 km<sup>2</sup>; Indigirsky, 7,900 to 9,700 km<sup>2</sup>; and Alazeysky, 1,950 to 4,380 km<sup>2</sup> (Degtyaryov and Labutin 1991).

Some (probably nonbreeding) birds spend the summer beyond the bounds of the observed region—in the Lena River basin (the Linde and Khoruonka River basins) west of the Zhigansk settlement (Degtyaryov and Labutin 1991).

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According to surveys of winter habitat in southeastern China, the current size of the white crane eastern population ranges from 2,610 to 3,000 individuals (Asia-Pacific Migratory Waterbird Conservation Strategy: 1996-2000; Harris and others 1994).

## Estimating Population Size in Northeast Yakutia

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During the last 40 years, volumes of material describing the Siberian crane's population in northeastern Yakutia have been collected by various investigators during special and passing aircraft surveys (table 1). The data collected are characterized by significant variation in population size and habitat size estimation. In all cases, the extrapolation of survey data was made without use of any necessary correction for methodical errors that can be introduced by conflict between aircraft and ground survey results.

The cartographic registration of birds (scale 1:100,000) during aircraft and ground observations in 1993 to 1997 (following banding in 1990 to 1992) within the 1,314 km<sup>2</sup> control site in the Indigirsky population resulted in the identification of 86 individuals: 38 couples, four single birds, and two groups of three birds each (6.54 birds per 100 km<sup>2</sup>). Forty of these birds, including 17 couples, were found in the course of a ground survey on July 5 to 10, 1995, in an area of 502 km<sup>2</sup> (38 percent of the control site). The local density of birds was 7.97 individuals per 100 km<sup>2</sup> (Germogenov and others 1996). A similar population density was observed during a ground survey dated August 5 to 10, 1995, in the territory adjacent to the control site—7.34 individuals per 100 km<sup>2</sup> (26 birds per 354 km<sup>2</sup>). Of the 38 couples recorded in the control site, 14 were observed during one season, nine during two seasons, six during three seasons, five during four seasons, three during five seasons, and one during six seasons (1990 to 1997). This observation reflects the difficulty of yearly bird tracking, but suggests a strong attachment for the territory. Accounting for annual variability in territorial fidelity and return rates, a population density from the control site of 5.4 birds per 100 km<sup>2</sup>, was indicated. Comparing this density with the estimates of Degtyaryov and Labutin (1991) for the same area (for example, 2.5 birds per 100 km<sup>2</sup> in 1985; 1.7 per 100 km<sup>2</sup> in 1987; and 2.63 per 100 km<sup>2</sup> in 1989) suggests a correction factor (K + 2.46) to convert aerial survey numbers to estimates of the true population size.

Applying this correction factor to white crane numbers in northeastern Yakutia (670 to 790 birds) estimated by aircraft survey (Degtyaryov and Labutin 1991) yields an estimated population size of 1,650 to 1,950 birds in this territory.

**Table 1**—Information on white crane habitat and numbers in the Northeast of Yakutia.

Information source	Period	Area of main habitat (centres of increased population density)	Number of birds in main habitat (centres of increased population density)
		<i>km<sup>2</sup></i>	
Vorobyov 1963	1957-1960	—	200-250 couples or 400-500 specimens
Uspenski and others 1962	1960	2,500-3,000	500-700 couples or 1,000-1,400 specimens
Yegorov 1965	1963	20,000	900 specimens
Yegorov 1971	1963-1964, 1966	32,000	1,500 specimens
Flint and Kisshchinsky 1975	1971	130,000 (30,000)	300 specimens
Flint and Sorokin 1982a,b	1977-1980	—	250-300 specimens
Perfilyev 1965	1960-1962	—	300-350 couples or 600-700 specimens
Perfilyev and Polakov 1979	1975, 1977	130,000 (30,000)	700 specimens
Vshivtsev and others 1979	1978	>130,000 (51,000)	325 (301) specimens
Labutin and others 1982	1980	65,560 <sup>a</sup>	433 specimens
Degtyaryov and Labutin 1991	1978-1989	82,000 <sup>b</sup> (21,530 <sup>c</sup> )	670-790 (572) specimens

<sup>a</sup>Total area of the population's main distribution.

<sup>b</sup>The population's regular breeding area.

<sup>c</sup>Total area of the three centres of increased density of the population.

## Particularly Protected Natural Territories

Preliminary population estimates are essential to evaluate the potential of the Particularly Protected Natural Territories system being developed in the Sakha Republic (Yakutia) to help conserve the white crane.

Historically, indigenous Sakha people both revered the white crane as an image of purity and femininity, and relied on it for meat and eggs (Andreyev 1974, 1987; Beme and Priklyonsky 1976; Ergis 1960; Maak 1886; Mikhel 1935; Vorobyov 1963). In the last century, legal measures for white crane protection in Yakutia were established (Hunting Regulations of 1962) that forbade the hunting of this species. The first Particularly Protected Natural Territory, which directly addressed conservation of the white cranes' eastern population, was established in the early 1980's.

The long-term plan for the Particularly Protected Natural Territory system was established by Sakha Republic President M. E. Nikolayev's Decree, "On Measures of Particularly Protected Natural Territories Development." According to the federal-regional legislative base currently in force, Particularly Protected Natural Territories are placed under the federal (State Sanctuaries and Reserves), regional (National Parks, Resource Reserves), and local (Reserve Territories) authority. Particularly Protected Natural Territories of regional and local significance are developed without their withdrawal from economic turnover, generally characterized by traditional nature use. According to the Decree, no less than 20 percent of the territory will be particularly protected by the year 2000. At present, the Decree is in force for 17 percent of the total area of the Republic.

Nowadays, white cranes are protected within their main range in northeastern Yakutia and adjacent territories in 13 Particularly Protected Natural Territories of republican and local significance (81,934.5 km<sup>2</sup> or 6 percent of the total area of the Republic). Their importance in white crane conservation can be judged from the data in table 2.

The Kytalyk Resource Reserve, established in 1996 with the help and support of the World Wildlife Fund, joined the

North East Asian Crane Site Network in 1997. Of the 13 protected territories in table 2, seven are included on the preliminary "List of Important Bird Areas" or I.B.A. (1996).

The Kytalyk Resource Reserve and the Chaygurino (two sites) and Khroma Reserves total 38,275 km<sup>2</sup> or 12.8 percent of the main range and 46.7 percent of the Yakutian population's regular habitat area. These three reserves carry most of the basic load of protection of breeding area and summer habitat. According to population estimates, 712 birds (37 to 43.7 percent of the population) nest or spend summers within these territories. Within these reserves are several "centres" of markedly increased population density. The Khromsky population centre accounts for 14 percent of the territory (or 1,477 km<sup>2</sup>), the Indigirsky centre makes up 33 to 40.6 percent (3,204 km<sup>2</sup>), and the Alazeysky centre (up to 1989) up to 90 percent (2,430 km<sup>2</sup>). Thus, the total protected area comprises 7,111 km<sup>2</sup> or 29.2 to 35.3 percent of the areas of increased population density and the habitat of 422 birds (21.6 to 25.6 percent of the total population).

Beyond this main range of the population, white cranes are sometimes found within territories and vicinities of the Ust-Lensky State Sanctuary situated in the Bulunsky Ulus (Labutin and others 1982; Perfilyev and Polyakov 1979), the Ust-Viluyky State Reserve in the Kobysky Ulus (Report *Cadastre of white crane in the Sakha Republic (Yakutia)* 1991), and the Ungra State Reserve in the Neryungrinsky Ulus (Perfilyev 1965). In addition, significant newly established Reserve Territories are situated in the migration zone and supposed summer habitats including: the Badyarikha (3,000 km<sup>2</sup>); the Shangina River Basin (2,000 km<sup>2</sup>) in the Abyisky Ulus; the Yasachnaya River Basin and Ozhogino River Basin (total 15,408 km<sup>2</sup>) in the Verkhnekolymsky Ulus; the Baraiyy (750 km<sup>2</sup>) in the Tattinsky Ulus; the Amginsky (8,071 km<sup>2</sup>) in the Amginsky Ulus; the Kuoluma (4,915 km<sup>2</sup>) in the Churapchinsky and Tattinsky Uluses; the Sunnagino-Siliginsky (10,000 km<sup>2</sup>) in the Aldansky Ulus; and the Chabda (6,638 km<sup>2</sup>) in the Ust-Maysky Ulus. Evaluation of their contribution to the conservation of the eastern population is impossible (with few exceptions) due to lack of data.

**Table 2**—White Crane in Particularly Protected Natural Territories of the Sakha Republic's Northeast.

Particularly Protected Natural Territories number and name of foundation	Date of Particularly Protected Natural Territories	Particularly Protected Natural Territories area in km <sup>2</sup>	Status of species <sup>a</sup>	Relative species (number of specimens <sup>b</sup> )
1. The Khroma State Reserve <sup>c</sup> of the Allaikhovsky Ulus	1992	1,130	N	39
2. The Chaygurgino State Reserve of the Niznekolymsky Ulus with the following plots:	1982	23,756	N	300
Alazeysky		6,154	N	160
Chukochya		14,911	N	140
Omolonsky		2,691	M	Probably nonrare.
3. The Kytalyk Resource Reserve with the following zones <sup>d</sup> :	1996	16,080	N	382
absolute seasonal rest (2 zones)		6,246	N	229
traditional nature use		1,411	N	69
license hunting the caribou		281	N	3
summer fishery		70	N?	5
holly land		66	N?	2
reserve zone		8,006	N	74
4. The Ozogino Lake Resource Reserve within the Allaikhovsky and Abyisky Uluses;	1996	2,412.5	N, S?	Probably rare and extremely rare.
5. The Sutoruokha Resource Reserve of the Abyisky Ulus	1996	5,000	M, N?, S	Probably rare to common. No more than 1-2 nesting couples.
6. The Saiilyk State Reserve of the Abyisky Ulus	1986	246	M, N?, S?	Probably common during migration and possible transit stages. The rest of the time is extremely rare (1-2 couples).
7. The Omoloy Resource Reserve Ust-Yansky Ulus	1996	3,325	M, S, N?	Probably common. No more than 1 nesting couple.
8. The Ygynnya State Reservation of the UST-Yansky Ulus	1988	1,856	M	Presumably common. Transit stages during migration possible.
9. The Eselekh Resource Reserve of the Momsky Ulus	1996	24,020	M, N?, S?	Probably common during migration. 1-2 couples the rest of the time.
10. The Zhirkovo State Reservation of the Srednekolymsky Ulus	1979	110	M	Presumably extremely rare.
11. The Sededema State Reservation of the Srednekolymsky Ulus	1992	650	M, S?	Presumably extremely rare.
12. The Sylgy-Ytar State Reservation	1988	140	M, S	Probably migration and possible transit stages. The rest of the time is extremely rare (1-2 couples).
13. The Yana River Delta Reserve Territory of the Ust-Yansky Ulus	1997	3,209	O, S?	Probably not numerous.

<sup>a</sup>N = nesting (N? = presumably nesting), M = passing during migration, S = spending summer, O = passing occasionally.

<sup>b</sup>The numeric data on Particularly Protected Natural Territories were gained by extrapolation, with the exception of the Yelon zone of absolute seasonal rest of the Kytalyk Resource Reserve.

<sup>c</sup>Owing to foundation of the Kytalyk Resource Reserve in 1996, the one of the Khroma Reserve's two plots (The Khroma-2, 4,100 km<sup>2</sup>) joined it as the Lower Khroma zone of absolute seasonal rest.

<sup>d</sup>The territory of the Yelon Reservation (1980-1996, 11,336 km<sup>2</sup>) is included in the Yelon zone of absolute seasonal rest.

## Protection and Research on the Particularly Protected Natural Territories

Potentials for white crane protection and monitoring in the Particularly Protected Natural Territories of the Sakha Republic (Yakutia) can be judged from the example of the Kytalyk Resource Reserve of the Allaikhovsky Ulus. There, a staff of four employees includes three huntsmen carrying out protection duties and nature observation, primarily of a phenological character. Thus, each employee is responsible for over 4,000 km<sup>2</sup> in need of protection. The population density of the Ulus is 4.94 persons per 100 km<sup>2</sup>. During June-September, the most important period for white crane protection, protection is augmented by cordons and temporary posts situated along the main sections of the Yelon River, blocking water routes into the Reserve's primary protected zones, but this defense system does not work where poachers use air and ground transportation. To increase protection of the Reserve and carry out monitoring observations (drawing researchers, specialists, and volunteer assistants from local residents), a system of internal cordons is planned within key habitats.

In the last 17 years, there have been about 50 reported violations of the nature protection legislation in the protected territories—mostly illegal hunting of caribou and polluting of the territory by hunting wastes. One case of Siberian crane death (1992) has been reported, but the reasons are still unknown.

The first scientific study of the white crane was carried out in the Reserve Territory long before the first Particularly Protected Natural Territories were established. Its results were cited in numerous publications where organizational problems of Particularly Protected Territories were discussed (Beme and Priklonsky 1976; Flint and Kisshchinsky 1975; Flint and Sorokin 1982a,b; Labutin and others 1982). Since the 1980's, research has been carried out principally by the Yakut Institute of Biology in close cooperation with the International Crane Foundation, the Research Centre of Wild Birds Community of Japan, and the World Wildlife Fund and their representatives. This work includes the scientific foundation for the creation and development of Particularly Protected Natural Territories, mapping of the population and banding birds, tracking of fall migrations with tiny satellite transmitters (P.T.T.), and population demography (Degtyaryov and Labutin 1991; Germogenov and others 1996; Germogenov and Solomonov 1997; Harris and others 1994; Nikiforov 1996). For the whole period, within the Reserve and adjacent territories, 18 adult birds (including nonpubescent specimen) and 43 chicks have been banded. Fifteen adults and two chicks have been fixed by the P.T.T. A map (scale 1:100,000) of two bird populations has been compiled reflecting the distribution of 213 birds, including 98 couples. In July 1996, for the first time, a bird that had been banded as a chick in 1990 was caught 19 kilometers away from the place of origin.

Research on the biology and conservation of the white crane has largely been limited to the Kytalyk Resource

Reserve and the Chaygurino Reserve and adjacent territories. The rest of the Particularly Protected Natural Territories have not been touched by ground researchers.

To increase the contribution of the developing Particularly Protected Natural Territory system of the Sakha Republic (Yakutia) for the protection of the white crane's eastern population, the following measures are proposed:

1. The existing Particularly Protected Natural Territories' area expansion: The Kytalyk Resource Reserve—at the expense of annexation of the Khroma Reserve (113,000 ha) and new territories, adjacent to the Khroma (toward the north and west up to the borders with the Ust-Yansky Ulus) and Yelon (toward the south up to the Kubalakh and Alysardakh Lakes and toward the northeast up to the Russkoye Ustye Settlement and the Indigirka River) zones of absolute seasonal rest—500,000 ha more:

- The Chaygurino Reserve's Alazeysky site—at the expense of the Alazeya River right bank—300,000 ha more.

2. Creation of new Particularly Protected Natural Territories (Resource Reserves) on the basis of the Kuoluma, Chabda, and Yana Delta Reserve Territories (at the expense of the eastern part of the delta and adjacent territories of the Yana-Indigirka lowland up to the Allaikhovsky Ulus' borders).

3. Completion of documentation preparation (and agreement with appropriate bodies) for inclusion into the North East Asian Crane Site Network, following existing and proposed Particularly Protected Natural Territories in the Sakha Republic. The most important for white cranes are:

- The Chaygurino State Sanctuary (the Alazeysky and Chukochya sites with total area of 21,065 km<sup>2</sup>)
- The Nizhneyansky Resource Reserve
- The Kuoluma Resource Reserve
- The Chabda Resource Reserve

4. Completion of project work to include the Yakutian white cranes' primary habitats on the "List of Important Bird Areas" (1996).

5. Acceptance by interested parties' appropriate bodies of the project, of multilateral "Agreement in the field of the white crane *Grus leucogeranus* eastern population and its habitats investigation and conservation for the period of 1997-2000" (P.R. China, Heilongjiang Province-ICF-Sakha Republic [Yakuita]), discussed in its first reading at the International Conference on protection of wetlands and waterfowl of northeastern Asia (Beidaihe, P.R. of China, March 4-7, 1997) and envisaging, in particular, organization of international expeditions to the nesting sites (the Cadillac Resource Reservation in Acadia/Russia), migration routes and transit stages (territory between the Alan and Aga Rivers, Acadia/Russia; Exhaling Marshes, Nature Reserve in Heilongjiang Province and Xiang Hai, Momoge Nature Reserve in Jilin Province P.R. China).

6. Drawing international, government, and nongovernment organizations to support nature conservation, and scientific and elucidative projects concerning the problem of conservation of the white crane eastern population and of the whole species.

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# Capacity Building in Protected Areas and Biodiversity Management in Cambodia

Daniel H. Henning

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**Abstract**—This paper deals with a situation where protected areas in Cambodia were resurrected after prolonged war, occupation, the almost total decimation of trained forestry personnel, and obsolete colonial models. This protected area resurrection and accompanying biodiversity considerations, however, encountered civil war with the Khmer Rouge (now surrendered), internal conflict, corruption, illegal logging, uncontrolled and massive logging concessions, security problems, and a lack of trained and experienced staff. The problems faced and solutions required to protect these areas and biodiversity values call for strategies, innovative training, and moral imperatives (including Buddhism) for capacity building and management, which are unique and which may have implications for neighboring countries.

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Cambodia has had a long history of land-use zoning, including protection of sensitive areas. Under the French in 1925, 10,700 ha of forested land around Angkor Wat were declared a national park; the first in Southeast Asia. Subsequently in 1935, 16 natural sites, including national monuments, were classified as protected areas. This action reflected the need to establish reserves for large mammals such as the Kouprey (*Bos sauveli*), the national animal. By 1972, a major classification and inventory of federal land listed 173 forest reserves (3.9 million ha) and six wildlife protection areas (2.2 million ha).

Once re-established, the Government of Cambodia continued (into the early 1990's) to regard these zoned areas as a "conceptual" system of reserves, although no organization existed to manage them. Various conservation consultants put forth protected area system proposals in response to signs of serious deforestation and exploitation. In 1993, under the supervision of Dr. Mok Mareth, Minister of Environment (then Secretary of the Environment), a serious proposal was put forward through IUCN, the IDRC (International Development and Research Canada), and the Royal Forest Department.

In a recent personal interview, Marshall F. Perry, Director, Society for Ecology and Wildlife Preservation/Cambodia, stated, "The main natural resource of Cambodia is the standing timber, which has decreased from 70% of the nation, to less than 40% in the past five years. Based on these figures, Cambodia will be devoid of forests by the year 2002." In the Bangkok Post, December 3, 1995, Global Witness

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indicated that, "extensive deforestation has now cut total (forest) cover to an estimated 30-35 percent of the area," while many estimates now place it much lower.

This rapid and uncontrolled decrease in natural forests is also true for other Southeast Asian nations like Laos and Vietnam, which are just starting to "open up" to resource exploitation. Thailand had over 70 percent of its area in natural forests 50 years ago, and now has less than 15 percent in protected areas, many of which are illegally being degraded. Like other tropical forest countries, Cambodia's national parks and reserves are currently subject to logging, encroachments, and poaching. Armed loggers with electric (battery operated) chain saws have made their way into several protected areas, while the military, including the Navy, are sometimes suspect of cooperating with illegal logging of protected areas.

Most projections indicate that the tropical forests of the world will be deforested or severely degraded by early next century, with some degraded remnants here and there. Cambodia's forests would certainly fit into these projections. Therefore, to establish and continue to create protected areas may be the only way to preserve some tropical forests and their rich biodiversity in what appears to be a very short time frame of 5 years. A major task confronting Cambodia is to list and prioritize proposed protected areas and buffer zones based upon adequate data, field work, and rationale.

One possibility discussed was that some of the potential areas be designated as "Protected Area Study Areas" for temporary stoppage of destructive activities relative to their future study and consideration. This might also include forest complexes based on the recognition that the ecosystems of adjacent forests and buffer zones are interconnected and that many wildlife species move freely among them. This could also apply to coastal and wetland areas and to the formation of international border protected areas with Laos and Vietnam.

## A Royal Decree for Protection

On November 1, 1993, King Samdech Preah Norodom Sihanouk signed a Royal Decree entitled, "Creation and Designation of Protected Areas," which was the basis for a new system of protected areas.

This Decree established a National Protected Areas System of 23 protected areas, covering 3.4 million ha, with the Secretary of State for Environment (now Ministry of Environment) responsible for supervising the planning and development of the system, incorporating the protection of terrestrial, wetland, and coastal environments. The Decree stipulates that the Ministry of Environment has authority to establish and chair appropriate interministerial coordination committees concerning the policy and technical needs of protected areas. The Decree further stipulates that the

management and administration of the System is the joint responsibility of the Ministry of Environment in collaboration with other institutions.

The Decree divided the protected areas into four categories of reserves with the following management objectives:

(a) National Parks: natural and scenic areas of significance for their scientific, educational, and recreational values, (b) Wildlife Sanctuaries: natural areas where nationally significant species of flora and fauna, natural communities, or physical features require intervention for their perpetuation (protection of Kouprey was major direction in reserves), (c) Protected Landscapes: Nationally significant natural and semi-natural landscapes which must be maintained to provide opportunities for recreation and tourism, and (d) Multiple-use Management Areas: the areas which provide for the sustainable use of water resources, timber, wildlife, fish, pasture, and recreation with the conservation of nature primarily oriented to support these economic activities.

A Sub Decree on Policy, Organization, and Management of November, 1993 (based on the King's Decree), presents an organizational framework for planning and developing the National Protected Areas System. The Ministry of Environment is to chair appropriate interministerial institutions to meet policy and technical aspects, including (a) the interministerial Sub-Committee for Protected Areas, (b) a Protected Areas Board, (c) an Advisory Committee, and (d) local boards.

Although based on previously existing reserves and on proposals by consultants, this new System lacks accurate information on the integrity and diversity of ecosystems within these areas. Some seriously degraded areas are known to be included.

## Biodiversity Considerations

If the Protected Area System is actually implemented in the field, Cambodia would have 19 percent of its territory under protection, making it one of the top Asian countries in terms of percentage of territory protected. Countries with rural and agricultural bases need to maintain high percentages as protected natural areas if ecological balances and services are to be maintained for long term and sustainable considerations for water, weather, soil, and so forth. Reforestation can never replace the role of natural areas and their biodiversity in providing these ecological balances and services.

Approximately 88 percent of the Cambodian people are located in rural areas and, consequently, are dependent on rural resources. With a higher proportion and integrity of natural lands protected, essential biodiversity services are also maintained and protected. The biological integrity of natural areas plays a particularly key role in watersheds and water supply for Cambodia. The natural forests of Cambodia are essential watersheds that continuously supply needed water for agricultural and other uses. Drought, poor ground water, and upstream damming of the Mekong River make these natural forest watersheds and their biodiversity bases increasingly essential. The watersheds also provide protection from erosion and flash floods from deforested hillsides and watershed degradation. Such floods have been noted every year from the 1980's and were particularly severe in 1996 with increased logging.

Cambodia is a signatory of the Convention on Biological Diversity of June 5, 1992, which calls for the establishment and management of protected areas for the conservation of biological diversity (both inside and outside of protected areas). Protected areas and biodiversity maintenance are major concerns and criteria by the World Bank and donor countries for developing countries like Cambodia. However, the current situation in Cambodia involves massive, uncontrolled (legal and illegal) logging by foreign corporations from Malaysia, Indonesia, Thailand, and other countries through logging concessions for over 20 million acres.

As with protected areas in other developing countries, much of the illegal logging takes place in protected areas and their buffer zones, along with encroachments, poaching of wildlife, and pithing of trees (burning the inside of trees). With little control available, large inroads are being made into their ecological integrity and biodiversity. A lack of trained protected area personnel prevents any effective control. Hence, the implementation of the National Protected Area System Decree and the Biological Diversity Convention, including the field personnel requirements, becomes an essential mandate for Cambodia and an important prerequisite for international funding and technical assistance.

## Legislation

The legislation for the National Protected Areas System includes the following, from the general to the specific:

1. 1993 Constitution of the Kingdom of Cambodia (which provides for state property comprising land, water, forests, and so forth, and for the control, use, and management of these state properties).

2. 1996 Law on environmental protection and natural resources management (purposes: upgrading of quality of environment and reducing and controlling pollution, conducting EIA before making decision on any proposed projects, ensuring conservation, development, management and utilization of natural resources in a sustainable way, providing opportunity and incentive in public participation, and subduing environmental impact).

3. 1992 Decree giving the mandate of nature protection to the Secretary of State of Environment (SSE) (now Ministry of Environment).

4. 1992 Sub-Decree giving the organization of the SSE (now Ministry of Environment).

5. 1993 Royal Decree establishing the system of protected areas and assigning responsibility for its management to SSE (now Ministry of Environment).

6. 1993 Sub-Decree on "Policy, Organization, and Management of Protected Areas."

7. Legislation establishing each individual protected area. [In process].

8. Regulations, rules, and management plan for each of the individual protected areas.

The Royal Decree of November 1, 1993, is the only legal mandate under which the Ministry of Environment is to act in respect to protected areas. But the articles regarding responsibility and designation of protected areas were not detailed, and these were indicated in the Sub-Decree on Policy, Organization, and Administration of National Protected Areas System. Amendments to the King's Decree

include: "This protected areas system may be amended or extended in the future on the basis of scientific information and the maintenance of the productivity of the Cambodian landscape," which may exclude considerations like environmental services of water and soil control, tourism benefits, and intangible values.

The Sub-Decree presents an organizational framework for planning and development that includes the Ministry of Environment chairing appropriate interministerial institutions to meet policy and technical needs. The institutions include (a) the Interministerial Sub-Commission for Protected Areas, (b) a Protected Areas Board, (c) An Advisory Board, and (d) local boards. Officials and staff from these ministries and institutions, however, often lacked the background and training related to protected areas.

Moreover, the various ministries, with overlapping jurisdictions and responsibilities for protected areas and their buffer zones, often operated autonomously (without coordination or integration) and with conflicts. This situation was particularly true at the provincial level wherein the ministerial staff was often under the direction of the provincial governors with multiple party officials. This aspect was further complicated by local controls and by the absence of Ministry of Environment staff at the provincial and local levels.

Current Cambodian legislation provides relatively little guidance on general policy and management of protected areas. However, any area that is subject to particular legal, administrative, or traditional controls and management could be considered a "protected area" in general. This concept could certainly be applied to the intent of forest protection and reserves for early protection measures in Cambodia and has existed throughout history worldwide as universal purpose for protecting natural ecosystems for various values.

General policy and management for protected areas in Cambodia is being developed. Yet, it is obvious that a major imperative is the ecological integrity and health of the areas as a mandate for protected area policy and management, which rings through internationally. As stated in the Yellowstone National Park Master Plan: "To perpetuate the natural ecosystems within the park in as near pristine condition as possible for their inspirational, educational, cultural, and scientific values for this and future generations." Unfortunately, with the "opening up" of Cambodia, protected areas (as well as those that are unprotected) are rapidly losing their ecological integrity and biodiversity.

## Directorate for Nature Conservation and Protection

### Policy and Administration

The key to the operation and effectiveness of the policy, organization, and administration of the National Protected Areas System will depend a great deal on the Directorate of Nature Conservation and Protection (DNCP), which acts on an interministerial basis as secretariat for the various interministerial committees and boards, as well as on an interministerial basis as the basic administration for protected areas under the Ministry of Environment.

The Sub-Decree on Policy, Organization, and Administration of a National Protected Areas System specifies the following administrative responsibilities for DNCP:

1. The management of a national protected areas system, including national parks, wildlife sanctuaries, protected landscapes, and multiple-use areas.
2. The development of recommendations to the Protected Areas Board for amendment of the protected areas system, including the extension of existing areas and the proposal of additional areas. These recommendations must be based upon information relating to biological conservation and the maintenance of productivity of the Cambodian landscape.
3. The development of policies and practices pertaining to the management of non-designated areas (marine and coastal areas, wetlands, watershed, and special interest areas).
4. The supervision of the overall administration within each protected area.
5. To act as the secretariat of the Interministerial Sub-Committee on the Protected Board.
6. To act as secretariat of the Protected Areas Board.

## Provincial and Field Issues

The above involve field relations with provincial governors and governments that have a great deal of authority and autonomy to direct ministerial and interministerial activities in their respective provinces. In the Cambodian context, ministerial personnel are stationed at the provincial level and, in many instances, more locally. Hence, any DNCP activities, including consultants, would be routed through the provincial governor for permission. Directorate for Nature Conservation and Protection interministerial training workshops, visits to protected areas and buffer zones, ad hoc training, and information gathering would include staff from other ministries, particularly forestry and fisheries (both agencies under the Ministry of Agriculture).

In the field, these forestry and fisheries personnel usually had a good knowledge of the protected areas (which were often designated from Forest Department lands) and frequently acted as guides. They were often very interested in protection concerns and training for the areas. Such cooperation is particularly important in buffer zones, which sometimes included reforestation projects and involved various ministries such as Agriculture, Rural Development, Tourism, and Defense in meetings and training through the DNCP and through consultants on protected areas.

In contrast, in the Norwegian protected areas system, the county governor serves as the management authority with "daily management" by the Forest Administration through wardens, while their Directorate for Nature Management serves as an advisory agency for guidelines and for allocating funds for the Ministry of Environment at the state level.

Beyond visits, DNCP staff were generally not present in the provinces or in the protected areas. Much of this was due to security. With the basic surrender of the Khmer Rouge, there is still endemic insecurity in the shape of Rouge military and bandits, aggravated by low pay and poverty. There are also mines that need to be cleared from work areas, and there is a lack of facilities, with a centralized bureaucracy in Phnom Penh.

## Innovations

It is important to have a well-trained and motivated DNCP staff in the field to deal with the illegal logging and poaching (which included many protected wildlife species) in the protected areas and to work with interministerial

coordination and training. One way of improving and facilitating the necessary field work would be to have a DNCP representative(s) assigned to a province or to a region with combined provinces. Local villagers (hunters were found to be the best guides) could then be hired as protected area guards and supervised by the DNCP representative(s). Eventually, it may be feasible to establish regular regional DNCP offices so that more administrative and support activities could be provided for the provinces.

An interministerial orientation is definitely required for the work of the DNCP in serving as a secretariat for the Interministerial Sub-Committee and Board on Protected Areas and for its various activities for the protected areas and their buffer zones as well as for the nondesignated areas. With official responsibilities and interests, numerous ministries are involved in, and outside of, protected areas and their buffer zones at the national, provincial, and local levels. Consequently, a great deal of formal and informal contacts, cooperation, and coordination between DNCP and other ministries is required as well as with international organizations like the UNDP and UCN.

However, the DNCP has tended to isolate itself from interministerial relations within its larger organizational context of the Ministry of Environment. Many of the perceptions and roles of the DNCP staff have focused on their internal workings, with little attention to interministerial or field relations. Consequently, capacity building in these areas requires special direction, funding, and training.

This direction would include more "hands on" field training and field placement of DNCP staff, along with more interministerial training workshops (with the various ministries and including participation of high level officials) at all levels of government. General and ad hoc training of this nature could address interministerial issues, cooperation, and coordination while dealing with overall or selected topics such as Tourism and Protected Areas, and Buffer Zones and Protected Areas. Training of this nature would also provide contacts and opportunities for DNCP and ministries staff to coordinate and work together on a longer term basis.

## **Organizational Structure of the Directorate for Nature Conservation and Protection**

The current organizational structure places the DNCP under the Minister of Environment, the Under Secretary (responsible for protected areas), and the General Director for the Ministry of Environment. The Director and Deputy Director of the DNCP are, in turn, responsible for administering the National Park and Wildlife Sanctuaries Office and the Wetland, Watershed, and Coastal Zones Management Office. The latter office deals with the policies and practices for nondesignated "wet" areas and involves the Directorate of Environmental Planning, Water Management and Land Use, with the DNCP focusing on protection measures and potential protected areas.

At a future date, it might be practical to form a National Park Division, a Wildlife Sanctuary Division, and a Multi-Use and Protected Area and Landscape Division. This arrangement could then focus on the special needs of these categories of protected areas. (Angkor Wat has its own

special area and arrangements with UNESCO assistance.) The present DNCP lacks (a) an interministerial section, (b) a law enforcement section, and (c) a naturalist interpretive section.

The need for interministerial concerns has been discussed, and it would certainly include law enforcement coordination to protect the ecological integrity of protected areas from logging, poaching, and encroachments. However, law enforcement is not entirely feasible and practical in the face of continued illegal logging and poaching, along with violence, corruption, and a general lack of security. Cooperation in this area is also not to be particularly expected under present conditions from the military who have their own agenda in respect to using natural resources for their own personal and collective gain. Nevertheless, special training and emphasis on a practical and innovative basis needs to be given to law enforcement for protected areas for both DNCP and interministerial considerations.

Internationally, a naturalist interpretive program is a vital part of any protected area system. The role of nature interpretation for protected areas is important for environmental education of the public, including people in buffer zones and surrounding settlements. It acts on a preventative basis to reduce negative human impacts on the ecological integrity of the area, as well as provides public understanding and support for the protected area and its biodiversity. Ideally, all DNCP staff should be exposed to some naturalist interpretation training for their contacts with the public.

## **Directorate for Nature Conservation and Protection Staff Assessments and Issues**

The creation of a relatively "new" Ministry of Environment (and its "new" protected areas unit) under the Cambodian system required unique training inputs, particularly with a lack of specialized and experienced personnel in protected areas. There are over 60 staff members in DNCP. Some of the staff have "engineering degrees" from institutions of higher learning, while others have "controller" certification from the equivalent of a technical high school. Because of the ambiguity and variety of education specializations and key positions, the former could be considered "generalists" (more on the professional level with line and policy-making positions), while others could be considered "specialists" (more on the expertise or technical level in a special field). However, most of the DNCP staff are now involved in general public administration as contrasted to their previous roles.

## **Training**

It was generally accepted that an on-going training program for capacity building was essential for the work of the DNCP staff and that special consideration had to be given to the varied, and sometimes inappropriate, education of the staff. As noted, professional foresters as well as educated professionals were greatly reduced by the Khmer Rouge, so experienced and trained staff were lacking, with marginal education for the younger generation. Most of the in-house training for the DNCP has been conducted as part of the

Ministry of Environment staff training program. Consequently, a great deal of the training subjects were of a general-issue nature and did not directly relate to protected areas administration.

However, two training workshops on protected areas administration were presented to the DNCP staff in 1994, and selected members were involved in two interministerial protected areas training workshops, as well as ad hoc "hands on" training in the field. A few members have attended overseas training programs on national parks and related areas. Thus, there has been a minimum of specific training for DNCP staff on protected areas per se.

Yet, it is recognized that there is a definite need for much more training for protected area policy and administration, interministerial relations, buffer zones and community relations, law enforcement, and so forth. Wherever feasible, this training should include relevant staff or representation from other ministries. It is particularly needed to supplement the limited backgrounds in protected areas that many DNCP and other ministerial staff have.

As noted, most of the DNCP staff are now involved in general public administration with little background due to previous training in technical subjects. It is recognized that many of the problems of protected areas center on public administration and personnel such as human and organization problems. Training in general public administration relative to protected areas would enable DNCP staff to deal more effectively with internal and external human problems and considerations and, hence, their capacity to better manage protected areas and buffer zones. This would include capabilities by key staff to deal with complex environmental, economic, social, and political issues that arise in decisionmaking for protected areas. Public participation considerations also need to be included in the public administration training.

Staff training and capacity building in interministerial relations need to be directed at tourism (including ecotourism), which presents a mechanism for protecting and maintaining areas as well as for providing socio-economic benefits to local people for reducing the pressures of degradation. The Ministry of Tourism projects over one million tourist visits to Cambodia annually by the year 2000. However, tourism can destroy the very thing that creates it. This holds true for both ecotourism, as well as traditional tourism, with its associated impacts of ecological degradation, pollution, crowding, and loss of quality scenery.

Numerous foreign corporations are now proposing and implementing tourism and resort developments in prime environmental areas, coastal areas, and protected areas, without proper planning or environmental assessment and with total disregard for environmental considerations. One prestigious and international sporting development "club" in a wetlands areas, for example, is oriented toward hunting all wildlife species, including rare and endangered ones. Some Cambodian officials were given free memberships in this "club." At this point, it would be wise to have all tourist developments in protected areas strongly controlled by the DNCP, as well as to provide more tourism planning and management training to DNCP and interministerial staff on a combined basis.

A sound background in the topics mentioned, along with some understanding of biodiversity, ecology, and wilderness

values would go a long way in inculcating the DNCP staff with an "esprit de corps" and awareness of the importance of their roles, thus increasing their capacity for effective and committed administration of the protected areas. Current patterns of DNCP having a centralized bureaucracy in Phnom Penh, with little staff contacts in the field, do not particularly encourage the development of a professional and committed protected area staff. In fact, many staff members may actually view their position as simply a government job without the needed understanding and dedication required to meet the challenges for protected areas and their biodiversity.

## Biodiversity Challenges

### Protected Areas

These challenges include the integrating and educating of protected area and biodiversity values and considerations into interministerial and public activities, including communities in buffer zones. Local Forest Department staff often have a good grasp of a given protected area and its concerns and need to be incorporated into actual operations at this time. A protected area understanding, tradition, or "internalization of values" requires time, training, and field exposure. Yet, these factors have only been available to the DNCP staff on a limited basis. Moreover, they have had to face severe security problems along with corruption and illegal and "legal" logging of the protected areas.

As an example, a statement by His Majesty (The Cambodian Daily, December 3, 1995) indicated:

Press reports and other sources have convinced me that the creation of forest and wildlife reserves and parks in Cambodia is not a serious undertaking. The parks and reserves are continuing to be violated, exploited, and destroyed by Khmers and foreigners. Under such extremely sad conditions, I declare that neither I nor the Queen my wife will agree to inaugurate or visit parks and reserves for forests and wildlife.

This situation holds true today. Without firm legislation, policy, planning, and administration for control and zoning measures, a great deal of uncontrolled land development, encroachments, illegal logging, poaching, and speculation (with national and foreign companies involved) is occurring in protected areas and their buffer zones. This is particularly true in coastal areas, with a high premium on recreational and tourism development. Under these conditions, many of the relatively new protected areas can be irreversibly degraded with inroads into their ecological integrity.

Consequently, it is essential to get more DNCP staff into the field so that some controls can be instituted. With corruption and poverty problems, reliance on the military for controls does not seem to be feasible at this point. Field staff, however, need facilities and equipment in the protected areas along with "hands on" training. The protected areas need access for patrols. Much of this could be done by developing trails and building ranger huts, and by hiring the unemployed and village people for this work and for serving as park guards. The protected areas lack signs or boundary markers that would also help to provide some controls. International donors, including the UNDP, appear

to give little attention to the above considerations, while funding centralized bureaucracy and distant rural projects (such as reforestation) that have little effect on protected areas and their buffer zones.

## **Nondesignated Biodiversity Areas**

Beyond the designated protected areas, it is recognized that most of the remaining natural forests are leased (or in process) to logging concessioners, besides the large amount of illegal logging occurring. Some of these forests contain high biological diversity and unique features that could establish them as quality protected areas. They also contain important forest watersheds. As noted, Cambodia had originally established 173 forest reserves prior to 1957, with various estimates of forest cover at over 70 percent of the land in 1969, as contrasted to current estimates of approximately 25 to 35 percent. Many of these and other forest areas need urgent study and action so they can be considered for protected areas, protected area study areas, or other preventative measures. Otherwise, degradation and deforestation will become irreversible, threatening the ecological integrity and biological diversity of the areas.

Consequently, it would be advisable to have a special interministerial program on protected area planning and acquisition to carry out a definitive program for identifying, investigating, and gazetting quality protected areas and protected study areas with high biological diversity of national and regional significance (Thailand has gazetted over 40 national parks in recent years). The Forest Department would be particularly involved in this type of program because most of the potential areas are on lands under their jurisdiction; this could include wilderness areas within Forest Department lands. International expertise (including Asian colleagues) and assistance would be required for the initial phases of the program, which would include remote sensing, satellite analysis, air and ground observations, GIS, and field studies.

Top priority should be given to protection of forest watersheds, particularly with upstream damming of the Mekong River, which is currently being planned on a massive scale by China and Thailand through the Mekong River Commission. Coupled with poor ground water, agriculture and other water needs will be very dependent on water from the forest watersheds, along with biodiversity considerations.

Consequently, coordination and cooperation with the Ministry of Agriculture and related ministries are essential, along with strong support from top leadership, including international organizations. Some interministerial efforts for watershed areas have been made along this line through the Mekong River Commission, but they need to be much more comprehensive. The above program could also include planning for transboundary, international parks, with continuous protected areas of Cambodia, Laos, Vietnam, or Thailand.

As recognized by the IUCN, buffer zones have a vital role to play in protected areas and biodiversity, particularly on mitigating the impact of human settlements. Currently, much of the emphasis in both rural and urban development

by international, bilateral, and NGO agencies alike is on community participation, including community forestry. These activities, however, are not necessarily geared toward the ecological and biodiversity aspects or toward mitigating the impacts of human settlements. The activities often include reforestation programs that are usually far away from any protected area. Given security and mine problems, little has been done to explore potentials for local populations in buffer zones for mutual contributions associated with protected areas, such as laying trails, serving as park guards, guiding, operating guest houses in the periphery, building facilities, and producing local handicrafts.

## **Buddhist Solutions and Conclusions for a Buddhist Country**

Many Buddhist Pagodas (temples) are located near or by protected areas, including buffer zones, where they have a strong and mutual sense of concern and interrelatedness with local populations. Buddhism provides the foundation of the philosophy and religion for the Cambodian culture, as well as a strong basis for reverence for all forms of life and their protection. Buddhism and Deep Ecology (the spiritual part of the environmental movement) are very similar in many ecological respects; both advocate an ecocentric rather than an anthropocentric approach toward life.

Although most of the senior Buddhist Monks were killed or disrobed during the Khmer Rouge period, Buddhism still commands a great deal of respect and integrity from all segments of society in Cambodia. Buddhist Pagodas can provide environmental education to local populations as well as serve as a bridge for public participation with DNCP and other governmental agencies. Buddhist Monks, Nuns, and laypeople can provide leadership and inspiration for bringing spiritually based ecological and biodiversity values to communities and to the public for their active participation.

With the need for experienced and knowledgeable Buddhist Monks and Nuns, limited training activities have recently been taking place, with the recognition that the Monks and Nuns are able to influence the population for the good. Growing corruption concerns in public and private sectors in Cambodia, particularly with massive "legal" and illegal logging, call for more attention to moral and spiritual education. Concerned national and international agencies and organizations, despite expertise, funding, NGOs, legislation, and technology have had little influence on the values and behaviors needed to protect the remaining biodiversity of the country from uncontrolled development and exploitation under current conditions.

Buddhism can serve as an integrative, environmental education, and spiritual mechanism and model for influencing the values and behavior of local communities, the public, and decisionmakers at all levels toward protection measures. It has the potential and means to provide spiritual solutions and paradigms to problems and issues that involve underlying value and moral considerations. Buddhism, in this sense, can do much to build the political and societal will that is essential to ensure the remaining ecological integrity of protected areas and biodiversity of Cambodia.

# Wildlife Need Habitat Off Limits to Humans

Michael J. Vandeman

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**Abstract**—In 4 million years of human evolution, there has never been an area off limits to humans—an area that we deliberately choose not to enter so that species that live there can flourish unmolested by humans. Yet, our observations and intuition about wildlife suggest that most want and need such seclusion in order to survive. Recent research confirms this. Even recreation, traditionally considered harmless, is actually detrimental to wildlife. Restoring true wilderness will require rethinking and redesigning all land uses and wildlife management regimes, as well as changing how we relate to wildlife.

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Human beings think that we own, and have the right to dominate, every square inch of the Earth. That, besides being an absurd idea, is the basic reason why we are losing, worldwide, about 100 species per day. Habitat loss is at the top of every list of the primary reasons why species have become extinct or are in danger of becoming extinct.

Outright destruction of habitat (for example, paving it or turning it into farms, golf courses, housing developments, or parks) is not the only way that an area can become untenable (useless) as habitat. Anything that makes it unattractive or unavailable to a given species can be considered habitat loss. Many animals simply will not tolerate the presence of humans. The grizzly bear and mountain lion are just two examples. The grizzly needs a huge territory, can smell and hear a human being from a great distance, and will avoid going near a road.

One of the first things that children learn about wild animals is that most of them run (fly, swim, slither, hop) away whenever we get close to them. (Only a few, such as mosquitoes, like having us around.) Some are more tolerant of us than others, but in any given area, there are at least some that don't like having us around.

Let's take as a premise that we do not want to cause any extinctions. If we agree with that, we have to set aside adequate habitat for all existing species, and much of it must be human-free. That is not understood by most people, even most biologists. We claim to believe in the Golden Rule, but we apply it only to fellow humans. It has been said that "The measure of a culture is how well it treats its least powerful members." By this, our own measure, human society is a failure in its relations with the rest of creation.

In 4 million years of human evolution, there has never been an area off limits to humans—an area that we deliberately choose not to enter so that the species that live there

can flourish unmolested by humans. There are places called "wildlife sanctuaries," where human recreation, hunting, logging, oil drilling, or even mining are usually allowed. There are a few places where only biologists and land managers are allowed (such as California's condor sanctuary). There have been places called "sacred," where only priests could go (in other words, they were "sacred" only to ordinary people). But to my knowledge, there has never been any place, however small, from which the human community has voluntarily excluded itself.

There has been a lot of talk in recent years about looking for life on other planets. For its sake, I hope we never find it! Why, after the inconsiderate way we have treated wildlife on this planet, should we be allowed to invade the even more fragile habitats that may be found in other places? While the thought of finding such life is intriguing, I haven't heard anyone suggest that we consider its feelings and wishes, such as the likelihood that it would want to be left alone (quite reasonable, considering our history). How are we going to communicate with intelligent life on other planets, when we can't even communicate with the intelligent life on this planet? Besides, since the laws of physics and chemistry are universal, it is unlikely that any such organisms would be dramatically different from those on Earth.

What scientific evidence do we have that wildlife need to be free of human intrusion? Not much, probably because scientists are people, and like the rest of us are instinctively curious about every thing and every place, and don't care to be excluded from anywhere. For most of us, travel is just entertainment, but scientists probably see their livelihood and success as depending on being able to travel to any part of the globe and "collect" (kill) any organism they find there. I doubt that there are many scientific studies of the environmental harm done by the pursuit of science.

As recently as 1979 (Wilkins and Peterson 1979, p. 178), we find statements like "Populations of wild animals can have the annual surplus cropped without harm." Insect field guides, such as Powell and Hogue (1979), also recommend collecting insects as "an exciting and satisfying hobby for anyone" (p. 359). Does that mean that collecting grizzlies or tigers is also an acceptable "hobby"?

There is recent research (Knight and Gutzwiller 1995) showing that recreation, an activity traditionally thought of as harmless to wildlife, can be harmful, or even deadly, to wildlife: "Traditionally, observing, feeding, and photographing wildlife were considered to be 'nonconsumptive' activities because removal of animals from their natural habitats did not occur...nonconsumptive wildlife recreation was considered relatively benign in terms of its effects on wildlife; today, however, there is a growing recognition that wildlife-viewing recreation can have serious negative impacts on wildlife" (p. 257). "Activities [involving] non-motorized travel...[have] caused the creation of more...trails

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in wildlands.... These activities are extensive in nature and have the ability to disrupt wildlife in many ways, particularly by displacing animals from an area" (p. 56). "Recreational disturbance has traditionally been viewed as most detrimental to wildlife during the breeding season. Recently, it has become apparent that disturbance outside of the animal's breeding season may have equally severe effects" (p. 73). "People have an impact on wildlife habitat and all that depends on it, no matter what the activity" (p. 157). "Perhaps the major way that people have influenced wildlife populations is through encroachment into wildlife areas" (p. 160). "Recreationists are, ironically, destroying the very thing they love: the blooming buzzing confusion of nature.... The recreation industry deserves to be listed on the same page with interests that are cutting the last of the old-growth forests, washing fertile topsoils into the sea, and pouring billions of tons of greenhouse gases into the atmosphere" (p. 340). (Note: wildlife have a hard time distinguishing between biologists and recreationists!)

In other words, if we are to preserve the other species with which we share the Earth, we need to set aside large, interconnected areas of habitat that are entirely off limits to humans ("pure habitat"). Our idea of what constitutes viable habitat is not important; what matters is how the wildlife who live there think. When a road is built through a habitat area, many species will not cross it, even though they are physically capable of doing so. For example, a bird that prefers dense forest may be afraid to cross such an open area where they may be vulnerable to attack by their predators. The result is a loss of habitat: a portion of their preferred mates, foods, and other resources have become effectively unavailable. This can reduce population sizes, cause inbreeding, impoverish gene pools, and impair ability to adapt to changing circumstances (such as global warming). It can lead to local (and eventually, final) extinction. Small, isolated populations can easily be wiped out by a fire or other disaster. Other species are not as flexible as we are. We can survive practically anywhere on Earth, and perhaps other places as well!

## What Wildlife Need

Wildlife are not that different from us. Chimpanzees, for example, are genetically 98 percent identical with us. Therefore, we should expect that they need just what we need: a place to live that contains all necessary resources (food, water, shelter, potential mates). It is not too hard to tell when animals are dissatisfied—they vote with their feet; they die, or leave. The key is to look at things from the wildlife's point of view. As simple and obvious as it sounds, it is rarely done. For example, how often do road builders consider how wildlife will get across the road? My cat communicates clearly what he wants: when he wants to go out, he whines and then goes to the door and stares at the doorknob; when he is hungry, he leads me to the refrigerator or his dish. We are proud of our power of empathy, but rarely apply it to wildlife. We don't want to be bothered by wildlife in our homes; wildlife apparently feel the same.

Go to any library, and try to find a book on human-free habitat. Apparently, there aren't any! There isn't even a subject heading for it in the Library of Congress subject index. I spent two days in the University of California's

Biology Library (in Berkeley), a very prestigious collection, without success. The closest subject is probably "wilderness," but wilderness is always considered a place for human recreation. So-called "wildlife sanctuaries" encourage recreation, and often allow hunting, logging, oil drilling, or even mining.

I once read Dolores LaChapelle's "Sacred Land Sacred Sex" (1988), hoping to learn what sacred land is. I didn't find an answer in the book, but I took the fact that sacred land is often restricted to the "priesthood" to imply that sacred land is honored by not going there! So we could say that human-free habitat is "sacred" land, except to priests and scientists (a type of "priest") who are always allowed to go there. (This is another indication that science desacralizes whatever it touches. Ironically, it is science that has proven the need for sacred land!) Probably the simplest term is "pure [wildlife] habitat," but "wilderness" and "wildlife sanctuary" should be synonymous with it. ("Wildlife" is "all nonhuman, nondomesticated species," and thus doesn't include us.)

I am not talking about de facto human-free habitat that is off limits simply because it is difficult to get to, such as the inside of a volcano or the bottom of the ocean. Such areas will all be visited in time as technology becomes available that makes them accessible. The key is the conscious decision of the human community to restrain itself from going there.

Some wildlife are sensitive to the presence of people. In order to preserve them, we need to create areas off limits to humans. It's educational. Publicity about areas where people aren't allowed teaches people about what wildlife need, and how to preserve them.

Some animals are more dangerous to people or livestock than humans are willing to accept (such as tigers or grizzlies). The only way we can preserve such species is to grant them a place to live where there are no people or livestock. Otherwise, whenever they attack someone, we kill them, as recently happened to a tiger that attacked a zoo employee in India.

The more accessible an area is to people, the less it is respected. "Sacred" land is accorded the highest respect. "Terra incognita" was not even mapped. A map tells people (nonverbally) that it is okay to go there. So do trails. Roads, which are built by a bulldozer "say" that we can do anything we want to the land. Even when bikes aren't allowed, it is hard to keep them out, because mechanically built trails indicate that the land is not important, and that rough treatment won't hurt it. Part of being sacred is the feeling of mystery. Mapping, roads, and other aids to human access destroy much of that feeling of mystery. For example, a map trivializes all areas and reduces them to a few lines and colors on paper. Beauty (except for some "scenic highways") and biodiversity are generally ignored.

Wildlife generally prefer human-free habitat. Because they are so similar to us, we have very little excuse to treat them differently. If we deserve to be unmolested in our homes, so do they.

There are too many species on the Earth, and too little time, to study them all and determine their precise habitat requirements. The only safe course is to assume that they all need at least the habitat that they now occupy, and preferably, access to their traditional territory. Or, as Aldo Leopold said, we need to "save all the pieces."

Obviously, we need to experience wilderness in order to appreciate it. But equally obviously, we need to practice restraint, if we are to preserve that wilderness. Having areas completely off limits to humans will remind us of that need to practice restraint. It is a reminder of the importance of humility, like the practice of saying grace before meals. It is the right thing to do.

## Practical Considerations

Parks, because they already provide some protection, are a good place to start building a network of wildlife sanctuaries. They provide the “seeds” of a “full-function” habitat-and-corridor matrix designed to preserve our biological heritage. But they need to be changed and renamed, because “parks” are, by definition and practice, places for pleasuring humans. Many parks should be allowed to revert to wilderness, and wilderness should be a place that we enter rarely, reverently, and on its own terms.

It is obviously nearly always impractical to maintain an area free of people by force. Probably the best that we can do is to remove all human artifacts, including nearby trails and roads. (This should be done soon, because it will become enormously more expensive as soon as we run out of oil!) Then a few people may be able to enter the area, but at least it will be at their own risk—no helicopter rescues! If we aren’t going to go there, then we don’t need to retain the area on maps; they can be “de-mapped” and replaced with a blank spot and the words “terra incognita.”

Roads and other rights-of-way are a particular problem. Due to the fragmenting effect of any such corridor, where it cannot avoid crossing a habitat area, it should, if possible, tunnel under the wildlife area so that wildlife can travel freely across it.

In large wilderness areas, there should be large wildlife sanctuaries. Even in cities and backyards where there is less viable habitat available, some of it should still be set aside for the exclusive use of wildlife because (a) it is fair and (b) it would serve to remind us to always keep wildlife in mind, just as indoor shrines in Japanese homes (and photos on our fireplace mantels) serve as a constant cue to remember gods and deceased relatives. After all, most human habitations are located on land that was also attractive to wildlife (such as near a source of drinking water). And cities form significant barriers to wildlife travel.

Having pure habitat nearby is very educational. I am experimenting with setting aside a 20 by 20 ft area in my back yard as pure habitat. It gives me a good opportunity to learn how to cope with my feelings of curiosity about what is going on there, desire to “improve” it as habitat, the need for a way to maintain its pristinity in perpetuity. Creating travel corridors is a major difficulty. However, recently I have heard that some San Francisco residents are tearing down their backyard fences in order to make it easier for wildlife to travel across the city.

What will wildlife and wildlands “managers” do for a living? Not all wildlife habitat will be closed to humans. They can manage the remainder. For those that will be closed, managers can remove all human artifacts and invasive non-native species, restore the area to its “wild” condition, and educate the public about what they are doing.

Roads, as we discussed, fragment habitat. Probably most major roads should be replaced by rail lines, which are much narrower in relation to their carrying capacity, and present much less of a barrier to wildlife. For example, the time between trains is much greater than the interval between motor vehicles on a road. We will soon be running out of oil and won’t be able to justify keeping so many lane miles of roadway open for the dwindling number of cars and trucks.

Many people may have to move. But compared to wildlife, people can pretty well take care of themselves. Wildlife, if we are to preserve them, must be given priority. They cannot protect themselves from us.

“People will not appreciate what they can’t see and use.” This is an obvious myth. Many people appreciate and work to protect areas that they may never experience directly. I don’t need to visit every wilderness area in the world to know that they need to be protected. I don’t need to see every Alameda whipsnake to want to save the entire species. Why cater to, and hence promote, selfishness? We need to protect many areas (such as Antarctica and the bottom of the ocean) long before we are able to bring people there to learn to appreciate them directly. The relationship between the number of visitors, and the degree of protection given the area, is not linear!

We have an instinct to explore; if an area is closed to us, that is exactly where we want to go! There are many areas of life where we need to practice restraint and where we all benefit from it—for example, in our relations with our family, friends, and community. Margulis and Sagan (1986) argue convincingly that cooperation (such as between eukaryotic cells and their symbiotic mitochondria), just as much as competition, has been responsible for our successful evolution. If we compete with other species, we will surely “win”—and then doom ourselves to extinction, just like a symbiont that destroys its host. We don’t have to indulge all of our “instincts;” in fact, we are better off if we don’t!

We still need access to wilderness in order to learn to appreciate it, but since we aren’t closing all wilderness to people, that need can still be satisfied. In fact, all children should be taken to see wilderness soon after they are born, because it is the only place they can see how things are supposed to be in this world! If they grow up around nothing but concrete, then concrete may become their ideal!

## How Pure Habitat Benefits Us

Pure habitat preserves species that are an essential part of our own ecosystems and on whom we are dependent for essential (food) or desired (a variety of foods) products and services. It provides a source of individuals to repopulate or revitalize depleted local populations (assuming that connecting wildlife corridors are maintained).

Knowing that wildlife are safe and healthy gives us a feeling of safety and security (like the canary in the mine), as well as the satisfaction we get from cherishing others (satisfying our “maternal or paternal” instincts?). We must carry a heavy load of guilt when we learn that our lifestyle is causing the suffering, death, or even extinction of our fellow Earthlings (such as from clearcutting tropical forests)!

Wildlife, even if we don’t utilize it directly, can teach us by giving us an independent view of reality and examples of different values (assuming that we listen).

For the sake of the environment, for our own health and happiness, and for our children we need to move toward a more sustainable lifestyle. The primary obstacle is our reliance on technology. Coincidentally, the primary threat to wildlife is also technology, for example, tools that make wildlife habitat more accessible such as maps, GPS sensors, satellites, bulldozers, 4-wheel-drive vehicles, mountain bikes, rafts, climbing equipment, and night-vision goggles. Banning the use of such technologies in order to protect wildlife can at the same time help us move toward a more sustainable future.

Perhaps the greatest benefit of all is distracting us from our selfish, petty concerns and giving us something more meaningful to work on. Remember “We Are the World”? People from all over the world united to come to the aid of a third party: the world’s starving children. While working together, they were able to forget their own needs, and focus wholly on rescuing children who were in trouble. Well, wildlife are in even more trouble! We all, according to Wilson (1992), instinctively love nature. Why not focus on this common value, work together to rescue the large proportion of the world’s wildlife that are in serious danger (according to the IUCN, one-fourth of the world’s animals are threatened with extinction), and put aside our relatively petty squabbles such as those causing wars all over the world?

Human groups often fight over things so subtle that outsiders have trouble understanding what all the fuss is about. For example, Canadians have long been bickering over which language to speak, while their forests are being clearcut and their water contaminated with mercury! Language and culture are important, but not in comparison to what wildlife have to endure, including extinction!

## Conclusions

The existence of life on the Earth is probably inevitable, given the laws of chemistry and physics and the range of conditions and elements available here. However, at the same time, the life of any given individual is exceedingly fragile. A hair’s breadth separates the living state from the

dead. In fact, there is apparently no difference between living and inanimate matter.

The proof is a seed. Take, for example, one of the seeds that germinated after being in an Egyptian pyramid for 3,000 years. What was that seed doing for 3,000 years? Obviously, nothing! If it did anything, it would consume energy, and use up its store of nutrients. Therefore, it was “alive” (viable), but undetectable so. (Similarly, there are frogs that yearly survive being frozen solid! Viruses and prions are two other examples of dead matter that engage in processes usually associated only with being alive.) In other words, life is simply a process, like the flowing of water, that can stop and start. (Or perhaps we should say that we are all dead, but sometimes undergo processes that are usually associated with, and called, “being alive.”) And it also follows that we are essentially indistinguishable from inanimate matter.

As I discussed earlier, we are also essentially indistinguishable from other organisms. Every lever by which we have attempted to separate ourselves from other species has, in the end, failed. So how should we treat them? We have no rational basis for treating them any different from ourselves. We need a place to live that is satisfactory to us, and wildlife need, and deserve, the same.

Are we generous enough to give other species what they want and need, and share the Earth with them? Do we really have a choice?

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# IV. Human Values and Meanings of Wilderness





# Wayfaring Metaphors and Environmental Ethics

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**Abstract**—The metaphors of home, place, and bioregion often fill the narrative of environmental ethics. But, these metaphors often exclude perspectives related to women and diversity, carry with them negative and restrictive connotations of home and family, and miss the lives and experiences of people disconnected from or uninterested in home and bioregional spaces. This paper explores the potentials and limitations of utilizing the metaphor of the wayfarer as an alternate approach to developing and maintaining an environmental ethic. The intent is to extend the repertoire of metaphors involved in the discourse of environmental ethics to develop other metaphors and narratives that connect people with nature in a variety of relationships that draw links between communities and bioregions.

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Within the discourse related to environmental ethics, the concepts of bioregional narrative, metaphoric frameworks of home and place, and the cosmological belief of sacred places have become prominent (Cheney 1989; Naess 1989; Rolston 1988). These frames (home, place, sacred site, bioregion) have enriched the discourse, explored alternative interpretations, and highlighted affective elements. Through the concepts of bioregions and homes, environmental writers have been able to elucidate characteristics of care, connection, embedded selves, and local responsibility. Leopold's Sand County retreat comes to mind as a classic example (Leopold 1966). But is staying in one place, developing a deep knowledge of that space and all its elements, and developing a deep sense of attachment to that space (sense of place?) the only, or universal, or even the most appropriate approach to developing an environmental ethic?

Since most metaphoric concepts are complex and include both positive and negative aspects, bioregionalism and home are not without their drawbacks. For instance, these metaphors often exclude perspectives related to women and diversity (Braidotti 1994), carry with them negative and restrictive connotations of home and family, and miss the lives and experiences of people disconnected from or uninterested in home and bioregional spaces. Furthermore, many people either desire to live in urban and suburban areas or

are no longer able to live in close connection to natural environments. From a purely pragmatic standpoint, it may no longer be realistic or possible to maintain the health of the earth and allow all individuals to live close to or within pristine environments. For many, they would not make the choice even if they could. If environmental ethics are to apply to various people, behaviors and circumstances, the metaphors must also be diverse.

Furthermore, focusing on one metaphor risks totalizing and essentializing the metaphorical frame of environmental ethics. If critical and creative discourse is to be sustained, vigilance is required to identify unifying systems that overlook, exclude, judge, or discount alternate and discordant views. Following the conception of objectivity suggested by some feminist post modernists, an objectivity related to the inclusion of multiple perspectives in the discourse or development of theory, we believe we must move toward diversifying the metaphors that shape and inform environmental ethics. Additional metaphors are necessary to create diversity in frameworks as well as content, to develop a dynamic flux between relational and complementary concepts, and to provide access to environmental ethics from multiple viewpoints.

We want to be clear that our aim is not to refute or discount bioregional and home metaphors, but to extend the repertoire of metaphors involved in the discourse of environmental ethics. This diversity is necessary for privileging various discourses and addressing challenges arising from changing, multilayered cultural and societal contexts. Considering the rise in travel and ecotourism around the world, it seems imperative that other metaphors and narratives are developed that connect people with nature in a variety of relationships and draw links between communities and bioregions.

## Movement and Environmental Ethics

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Narratives related to displacement interpret the realities of how some people connect with the world and land around them. The terms related to travel, displacement, movement, or mobility all carry historical and sociocultural meanings. We will use a variety of terms interchangeably as we develop a stronger position related to the words themselves and begin to develop a metaphor of travel for environmental ethics. Displacement narratives may allow us to explore other points of view, understand the larger ecological systems of the earth, and develop a global consciousness (Cuthbertson and others 1997) as well as illuminate elements of exploitation, degradation, imperialism, and colonialism (Braidotti 1994; Kaplan 1996).

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As with the concepts of bioregionalism and home, there are multiple facets of the movement metaphors that spin tales of both healthy relationships and destructive behavior. In this paper, we begin to explore metaphors related to movement and their potential for enriching the discourse on environmental ethics. We believe environmental ethics are at the heart of wilderness preservation around the world. Without an environmental ethic that values wilderness, there would be no wilderness for the present or the future. The discussion that follows wanders through stories related to travel, environmental ethics, multiple perspectives, social responsibilities, and philosophical weaknesses in an attempt to develop a robust arena for future discussions.

Each word and concept of our language comes with histories, contexts, and nuances. Travel is no different. Travel is a vast conceptual area that contains multiple historical, geographical, and cultural ramifications and generates a complex system of cultural representations and hegemonic practices (Said 1983). Consequently, we want to think through these differences and implications, through these knots of power and violence that have often accompanied the various words and concepts related to displacement and travel. The key to moving within a chaotic and changing horizon is to acknowledge and identify the current situatedness, accountability, and partial perspectives of the interpretations we create. Adrienne Rich (1976) is convinced that "...there are ways of thinking that we don't yet know about...Thinking is an active, fluid, expanding process...[while] intellection and 'knowing' are recapitulations of past processes" (p. 290). However Kaplan (1996), in her book "Questions of Travel," warns us to move carefully as we work through metaphors and critiques so that we do not build upon existing stereotypes and hegemonic representational practices.

We feel an urgency to elaborate alternative accounts about environmental ethics, to learn to think differently about environmental ethics, and to invent new frameworks, images, and modes of thought without romanticizing the accounts. With these needs in mind, we propose to describe a travel metaphor related to environmental ethics, present examples of how elements of mobility appear in outdoor/nature/wilderness literature and may be relevant to environmental ethics, frame some questions about power and hegemonic practices related to travel, and discuss future directions for the role of travel metaphors and environmental ethics.

## Exploring Traveling Metaphors \_\_\_\_\_

Cuthbertson and others (1997) critique the concept of "natural rootedness" and propose mobility as another mode for connection with the outdoors. Their examples of mobility revolve around aboriginal hunter-gatherer cultures of sub-arctic Canada and Alaska and the lifestyles of contemporary outdoor educators. Following two examples of how movement supports connection with the environment, they argue that movement may be an "...emphatic connection to a larger whole [and] contribute to a more holistic sense of place" (p. 74). We want to explore how metaphoric thinking might parallel their conclusion that "...ecologically and culturally sensitive travel can enhance the depth of connection to Place, and by extension, our commitment to ecological and cultural dignity" (p. 75).

Etymologically, metaphor comes from the Greek "metaphorad" or "metaphero," meaning to transfer, and the French "metaphore," meaning to bear or to carry. The Oxford English Dictionary (1994) describes metaphors as "figures of speech in which a name or descriptive term is transferred to some object, different from but analogous to, that to which it is properly applicable." The essence of metaphoric knowledge is the understanding and experience of one thing in terms of another. Metaphors are a matter of both experience and imagination. Lakoff (1987) provides evidence that metaphors are embodied in the natural dimensions of experiences. These natural dimensions are preconceptual physical and emotional experiences of the world that express our physical connection with the natural world (inside and outside or above and below) and extend to our intellectual and moral relationships. The power of metaphors illuminates human thinking and values while exploring the potentialities of thought and language. Such explorations seek to disrupt the habitual desire to know about the Other, and move us toward learning to live another form of life (Cheney 1989). Jay (1986) states, "...language bridges subject and object worlds, inner and outer. Language is the path, the game trail, the river, the reverie between them. It shimmers there, revealing and nourishing their interdependence. Each word hears and locates our meetings with the world. A word is a dipped breath, a bit of spirit (inspire, expire) wherein we hear the weather. Our 'tongues' taste the world we eat. At root [this] language is sacramental" (p. 101-102).

However, metaphoric thinking also limits understanding because of the inherent limits of the metaphoric structure. The systematic structure, inherent in a metaphor, that helps us understand one aspect of a concept in terms of another will necessarily hide other aspects of the concept. Therefore, every metaphor highlights certain features while suppressing others. What is highlighted or suppressed in metaphors related to environmental ethics becomes vital in discussions of exclusion, environmental justice, and diversity.

How do we develop metaphors that are inclusive rather than exclusionary to some people? How do we connect narratives about travel to environmental ethics? Developing a traveling metaphor for environmental ethics involves, at a minimum, understanding characteristics and meanings of words and concepts, analyzing and attending to multiple historical and contextual perspectives of the metaphor, drawing explicit connections between metaphors and ethical frameworks, and participating in ongoing dialogue and revisions.

Travel or displacement is a temporal and spatial concept that incorporates various continuums of choice, power, purpose, and consequence. The variety of words, concepts, and contexts related to displacement is astounding and provides much room for analysis and discussion. Notice the range of characteristics associated with human movement related terms: wander, adventure, expeditions, explore, drifting, nomad, pilgrim, roam, quest, tourism, visit, troubadour, migrate, homelessness, diaspora, gypsy, refugees, pilgrims, shamans, and exiles. It is important to understand that each word carries with it subtle but powerful nuances and implications.

Wandering is to ramble without definite purpose or objective, without a conscious intent or direction. A wanderer moves causally, deviates from a course, resists going in the direction of the main group. Closely connected with wandering is roaming motivated by restlessness or curiosity. In German, "wanderjahr" is a year or period of travel when one is absent from work or in which an apprentice travels and improves skills before settling down to practice a trade. A journey is the process of traveling from one place to another over long distances and great time, but a traveler is someone who moves in a fixed course from one point to another. Drifting, on the other hand, is a motion driven by a force or current much like a raft on an ocean current. An adventurer is one who seeks fortune in daring enterprises or undertakes great risk, while an explorer is one who investigates, examines, and scrutinizes unknown regions or traverses for the purpose of discovery. Nomadic patterns suggest no fixed abode and movement dependent upon resource supply such as food, jobs, or pasturage (Fonseca 1995). A wayfarer is one who travels especially on foot, while a pilgrim is one who journeys to some sacred place as an act of devotion. Migration implies a process of moving from one country, region, or place to settle in another or to pass periodically from one region to another. Numerous words also connote a means of locomotion: wayfare (by foot), hitchhike (by car), journey (often by mechanical device), voyage (by boat), and trek (by foot and with difficulty). There are other words related to temporal periods in one location: guest, visitor, tourist, or sojourner. With all of these different words and meanings it is no wonder there is often confusion as to the true meaning of travel metaphors.

## Travel and Journey Metaphors

This superficial tour of concepts related to travel and journey invites closer inspection and analysis. We would like to begin this inquiry with some relevant narratives from the natural and cultural world, psychology, outdoor recreation, and environmental ethics.

In the natural world, the phenomenon of migration connects different ecosystems across space and introduces new elements throughout the ecosystems crossed during the migration. In fact, plankton, a vital element of one food chain, is derived from the Greek word *planktos*, meaning wandering. Some species of animals force their young to move on and add to changes in the ecosystems. Migrations of animals or people have often been the changers of systems and potentially supported health for all. Displacement and movement are clearly connected to how systems enforce change, flexibility, and growth.

There are numerous examples of aboriginal or indigenous cultures that integrate movement into their way of life and relationship with the natural world (Cuthbertson and others 1997; Thomashow 1995). Travel allowed the Athapaskans of North America to live lightly on, and develop a close connection with, the land. Australian Aboriginal people revisit sacred areas as they reenact the journeys of their ancestral heroes and continue to protect all that lives and grows. They travel as a way to maintain the balance and connection, and to maintain a reciprocal thinking process with humans, the land, ancestors, and the cosmos. The Kogi

of Colombia refer to their frequent moves as a weaving on a loom of every hill, valley, and mountainside of their region. Careful weaving keeps the world well. The steady traversing of their environment reflects a profound networking and intimate knowledge of the sacred legacy bequeathed by the ancient ones and a guardianship of the earth (Thomashow 1995).

In the psychological arena, the journey has often been the medium to find enlightenment, a deeper understanding of the self, the world, and the spiritual. Joseph Campbell's hero journey model revolved around the process of being called to the journey and finding enlightenment in the process of the hero's quest (Campbell 1968). Campbell's hero quest has received criticism for being a masculine, dragon-slaying paradigm. But the hero journey as expanded by Carol Pearson in her book "Awakening the Heroes Within" (1991) seems to offer some more inclusive metaphors appropriate to the development of environmental ethics. In her model, the journey is in the mind as well as the physical, and a hero described by her is the "sage," a wise, perceptive, and discerning person who seeks harmony in relation to others and to the environment.

The historical heritage of wilderness, outdoor recreation, outdoor education, and nature writing is replete with accounts of those who have wandered in the natural world (Nash 1982). Travelers who commit to an area stay long enough to begin the process of true understanding. That time allows for an immersion in place over time and attention to patterns that the mind can scrutinize and discern widely, including dates of arrivals and departures, births, flourishing, decays, deaths of wild things, successions, synchronicities, dependencies, reciprocities, and cycles. Residency in wild nature and the associated visceral knowledge of wildness are of vital importance to seekers and wanderers (Turner 1996).

A traveling naturalist from Japan, Basho, describes this environmental wanderer concept well in his writings and haiku, "I do not remember when, but I have conceived the strong desire for a wandering life, giving myself up to the destiny of a solitary cloud as it is wafted in the wind. After spending some time along the seashore, I settled last autumn for a while in a tumbledown hut that stands by the river...But as the year approached its end, my wandering spirit voiced itself once more. It was as if I were pursued by a supernatural being whose temptation was more than I could resist..." According to Basho, the spirit of what he termed "Eternal Aloneness" is the chaste enjoyment of life and nature. "He who cherishes it accepts Nature and becomes a friend of the four seasons" (cited in Thomashow 1995, p. 130).

Many early nature writers in the United States, those who formed the basis for the environmental and wilderness movements there, were wanderers, travelers who went on journeys into nature. They often developed and refined their environmental ethic through journeys rather than by staying in one place. John Muir (1980) is usually associated with the Yosemite area of California, but he traveled extensively throughout the Sierra Nevada range and into Alaska. Aldo Leopold (1966) traveled extensively in remote areas of the American Southwest before settling into his "Sand County" retreat. Much of Leopold's philosophy of environmental and wilderness ethic seems to be based on these travels. Even

his accounts of life on his land in the metaphorical Sand County are often presented in the metaphor of taking a journey. His description of taking a journey back in history through the counting of rings in a newly fallen tree is an example. Thoreau interrupted his stay at Walden Pond with a trip to the wilderness of Maine's Mt. Katahdin. This journey altered his attitudes and philosophies on wilderness from a place that appeared open and welcoming to a sometimes beautiful, harsh, and cruel environment, a place that operates by orders other than those of humans. It was an experience of humility that shaped his later writings on the need to preserve these special places where people do not live but only visit (Bergon 1980).

Rachel Carson was a nature writer who had a significant impact on the environmental movement. Much of her environmental ethic was shaped through long walks along beaches at "The Edge of the Sea" (1955). Carson was one of the first writers to note that wilderness protection is linked to a larger whole. She believed that protection of the whole environment, and attitudes toward it, affect our actions. Her classic book "Silent Spring" (1962) explained pesticides' destructive implications for birds and animals. But even that book had a journey metaphor attached to it. In a letter she wrote to a friend as the book was nearing completion, she believed that through her journey of researching and writing "Silent Spring" she was able to help herself and others understand the implications and dangers of chemicals introduced to the natural environment (Brooks 1980).

Some of the more contemporary wilderness policy formulators who so eloquently described the benefits of wilderness, and the necessity of preserving it while it still existed, were travelers rather than those who stayed in one place. The founder of The Wilderness Society, Bob Marshall, with his extensive travels through wildlands throughout the United States and the then territory of Alaska, was a legendary wanderer (Glover 1986). A more recent wilderness traveler whose published accounts have had major influence in the popular literature is Colin Fletcher (1997). His journeys through the Sierra and Cascade Mountains, the Grand Canyon, and most recently the Green and Colorado Rivers seem to appeal to the wilderness wayfarer in all of us.

Individuals who are drawn or driven by forces to travel have added substantially to our environmental understanding. These wayfarers have developed a "map" of earth that has allowed us to see connections beyond boundaries, and with places nontravelers could not imagine. The connection of habitats thousands of miles away could only be identified and mapped by individuals willing to travel through the landscape. There are numerous ways we can map the world. We can map boundaries, travel routes, ecosystems, energy flows, and relationships. Mapping provides opportunities to conceptualize, make and use images of place and movement.

If you gather a group of people together and ask them about maps you will always get a lively response. Like the universal fascination with moving water or the dance of a fire's flame, maps hold some primal attraction to humans. For some, it is the memory of a treasure map followed in youth, or a scramble to a mountain vista etched forever in personal memory. For others, it is an almost magical chance to see what otherwise is hidden. And for others maps reveal the mysteries of the present and the future of place through

the depiction of fixed and flowing energy layered in patterns of opportunity. Whether in our minds, or printed on paper, maps are powerful talisman-like forms to our individual and social reality. They are models of the world, icons if you wish, for what our senses see through the filters of environment, culture, and experience (Chatwin 1989).

Travelers provide a different interpretation for our maps, the conceptualizations of movement, energy connections, consequences of local actions, new interpretations, and variations on the answers to profound questions. Darwin's (1889) voyage in "The Beagle" not only opened the world of natural history but changed our very concept of who we are in relationship to the natural world. Darwin was an individual who traveled the world and studied the life cycle of the worm. Here was an individual who enacted the tension and the necessity of both belonging and looking at detail and seeing the global scale through traveling. As another example, Leopold's (1966) concept of humanity was as a "fellow voyager" in the evolutionary enterprise. Without the wanderer, we could not know that our waste damages the water down river. Without the travelers, we could not know that the destruction of rain forests affects the air we breathe. Without the wanderer, we could not know or imagine the wonders of remote wilderness areas we have not yet visited.

## Alternative and Discordant Harmonies

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All displacements, however, are not the same. Travel, signifying both commerce and leisure movements in an era of expanding Western capitalism, is a modern concept. Clifford (1992) holds that this type of travel carries a certain amount of historical taintedness in light of the fact that the numerical majority of people who move in this world do so to work or survive life-threatening events. Displacement, on the other hand, refers to mass migrations or forced moves that are caused by political, societal, cultural, and economic changes (Clifford 1992). To maintain a commitment to diversity and environmental justice requires questioning the cultural, political, and economic grounds of the different professions, privileges, means, and limitations related to displacement and travel.

## Critiques of the Travel Metaphor for Environmental Ethics

We see three major critiques that are pertinent to the process of developing a philosophy of environmental ethics based around travel or movement.

**Privileging the Solitary, Well-To-Do Traveler**—Many of the stories about travel and outdoor recreation focus on one individual with the wherewithal to move with freedom. Such autonomy and personal resources are not available to many people of the world. A look at the classic nature writers of North America is an illustration. Most of the wilderness or nature wayfarers whose writings formed much of the philosophical basis for the North American environmental and wilderness movement were of a limited range of social class. Most of these classic wanderer writers were highly educated for their time (Leopold, Marshall, and Thoreau are

examples), and many were from the upper economic class (Marshall as an example).

Most of the published writers were male; however, there were exceptions. Susan Fenimore Cooper wandered the woods of New York State and published her nature writings in the 1850's, 4 years before Thoreau (Knowles 1992). In the 1870's, Isabella Bird traveled from England to Japan, China, India, Persia, and to the United States, maintaining journals with precise geographical and botanical observations. She climbed Long's Peak in Colorado's Rocky Mountains in 1873, and wrote about the profound impact of this journey on her attitudes towards nature in her book "A Lady's Life in the Rocky Mountains" (1960). But her writings received little attention in the male-dominated culture of the United States at that time.

MacCannell (1976) questions this fascination with singular, elite figures of travel. Renato Rosaldo (1989) views this fascination as a type of imperialist nostalgia where an image of a bygone era is created, reflecting freedom, open spaces, and power. In addition, people (wives, guides, interpreters, friends, and benefactors) who supported the solitary wanderer are often not within the narratives. The narrative emulates nomadic individuals, who appear to be unattached and who have an unquestioned power to move and affect changes in various areas.

In a larger context, approximately 24 million people live as citizens in nation-states under conditions of intransigent displacement characterized by homelessness and chronic hunger. Increasing numbers of people have become disengaged or dislocated from national, regional, and ethnic locations and identities (Pratt and Hansen 1994). These stories of forced displacement, people moving without resources or freedom, and political processes that move to disenfranchise people who are not located in specific places are not highlighted in stories of the solitary, free, privileged individuals. Therefore, a metaphor of travel that highlights the privileged, solitary traveler leaves invisible and excludes the reality of group displacements based on lack of resources and force.

**Traveling Elsewhere To Get It**—MacCannell (1976) has characterized Euro-North American modernity as a propensity to look elsewhere for markers of reality and authenticity. When the past is displaced, often to another location, the modern subject must travel to it. History becomes something to be established and managed through tours, exhibitions, and representational practices in cinema, literature, and other forms of cultural production. The metaphor of travel and associated journeys can feed the illusion that someone somewhere else, some teacher, or some holy ground will provide the answer. People journey great distances to places like Tibet, India, and Machu Pichhu to gain access to their souls. Sometimes a new place in the outer world does in fact open up a new inner space or awareness. Outer landscapes can put us in touch with our soulscapes. But it can also be an escape or diversion. The metaphor of journey risks exacerbating the tendency of Euro-North Americans to look outward for solutions or diversions, which only alienates us more from our inner lives. Journeying by moving through space and time may only increase our (Euro-North American) already epidemic sense of rootlessness and loss of a sense of place.

**The Connection of Travel With Exploitative Patterns**—Fussell (1980) describes a continuum from the extreme heroism of exploration to the crass vulgarisms of tourism. "If the explorer moves towards the risks of the formless and the unknown, the tourist moves toward the security of the pure cliché" (p. 42). The myth of discovery has been deconstructed by critics "...as powerful masculinist discourses...adventure and exploration writing proved to be instrumental in the construction of rationales for imperialism".

Fussell (1980) goes on to discuss some eerie parallels with the modern day. "What distinguishes the tourist is the motives, few of which are ever openly revealed: to raise social status at home and to allay social anxiety; to realize fantasies of erotic freedom; and, most important, to derive secret pleasure from posing momentarily as a member of a social class superior to one's own, to play the role of a 'shopper' and spender whose life becomes significant and exciting only when one is exercising power by choosing what to buy" (p. 42).

## Questions About the Appropriateness of the Travel Metaphor

These critiques move us to ask questions similar to those posed by Clifford (1992). How do different populations, classes, and genders travel? What kinds of knowledge, stories, and theories do they produce? How are these differences relevant to a metaphor of displacement for environmental ethics? The specific dynamics of traveling must be comparatively analyzed. How does one disentangle the tradition of heroic travel and exploration from our current words and images describing outdoor recreation, outdoor education, and wilderness? Romanticizing or mystifying such individuals or actions can only replicate the oppressive practices described by Fussell. How does one create metaphors of movement that extend the meaning and application of environmental ethics across boundaries of gender, race, culture, and socioeconomic status among many?

The numerous concepts associated with "travel," as it is used in Europe and North America, cannot escape the historical legacies of capitalist development and accumulation of imperialist expansion. Bell Hooks (1992) has argued that "travel" is produced from a center of Western social and political power. She writes that while she appreciates efforts to make the term more inclusive, "Travel is not a word that can be easily evoked to talk about the Trail of Tears, the landing of Chinese immigrants, the forced relocation of Japanese-Americans, or the plight of the homeless" (p. 173).

## Many Roads Diverged

The symbolism of wayfaring seemed very appropriate for our wanderings in this paper. Wayfaring is about moving through the world by foot. Wayfaring connects a metaphysical realm of enlightenment and a physical world of moving and exploring. Wayfaring is often marked by the symbolic journey, which partially signifies a quest for unity, curiosity about the world and people, and development of self-knowledge (Pearson 1991). The way in many respects becomes indefinable apart from the wayfarer. It is the wayfarer's

presence that makes it possible to speak about the way. Furthermore, as long as there exists a step to be taken there are alternatives and hence possibilities of comparison. There is excitement and risk associated with movement. Moving along the edges of great storms and changes, like the pelican and the albatross, provides a sense of freedom and risk that underscores life, change, disruption, and rhythmic order. The travels of the salmon between the two worlds of sea and freshwater not only connects and changes two ecosystems, but nourishes people and cultural traditions (Turner 1996).

In our search for answers, many cultures and societies have forgotten to wayfare. This is especially true of the more modern and technological societies that look for linear and direct cause-and-effect relationships. They continue unwaveringly on one path and forget that tension, ambiguity, and diversity is where life can be most fecund. They need to linger and detour playfully.

Metaphors related to human movement are connected with the heritage of wilderness travel and preservation, outdoor recreation, outdoor education, and environmental ethics. Many of the philosophers of these fields wandered through natural lands. Exploring the words and concepts related to travel indicates a fertile area for enriching our understanding of environmental ethics and extending their meanings across boundaries. As we work through the meaning of the metaphors, we must stay ever vigilant that our centers and images usually displace others into peripheries (Probyn 1990).

Politics of location was a term coined by Adrienne Rich (1979) to articulate the concerns of regional, particular, and local interests in a number of different fields and disciplines. Politics of location functions as both a marker of Western interest in other cultures and signals the formation of diasporic identities. It encourages resistance to hegemonic formations through developing theories, images, and metaphors that begin with multiplicity and accountability. Who writes of difference, location, and travel? Who gains? Braidotti (1994) points out that positionality and accountability go together. Creating new metaphors that support environmental ethics means we must struggle and question one's privileges and the taking of responsibility that it entails. The struggle must include ways that mutually heighten vulnerability without eliminating conflict (Dhareshwar 1993).

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# Person and Environment Transactions During Brief Wilderness Trips: an Exploration

Norman McIntyre

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**Abstract**—Studies in industrialized nations have indicated that the societal context and duration of wilderness trips has changed dramatically in recent times. This study reports on the multiphasic sampling of a short-term wilderness canoeing experience in south-eastern Australia. The character of these wilderness trips was typical of modern times—short, activity focused, and comfortable. Despite the brevity of the trips, various wilderness values including timelessness, care, solitude, and oneness were achieved. Contrary to wilderness traditions, these values were facilitated significantly more through nature-based activity than through passive contemplation. The implications of these findings for wilderness management are discussed.

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The nineteenth century in America marked the beginning of the development of the wilderness ideal (Oelschlaeger 1991). From the early writings of Thoreau and Muir through Leopold and Olsen to the poetry of Jeffers and Snyder, American nature writers and philosophers have articulated and justified the values and benefits of wilderness experiences. These various scholars described the physical (solitude, strength, and health), mental (independence, competence, and creativity), and spiritual (unity with nature, humility, and inspiration) values associated with wilderness visits.

Despite broad community acceptance of these values, relatively little is known about the extent to which today's wilderness users seek and obtain the kinds of experiences that these nature writers espoused. There are indications that current visitor experiences may be quite different from those suggested. While nature visits to national parks, forest parks, or remote wilderness are becoming more popular (or are at least maintaining their popularity within industrialized nations) (Lime and others 1995), such visits are also demonstrating significant changes in character and frequency:

- The general trend in visits to nature-based recreation areas appears to be one of increasing preference for more frequent local trips of shorter duration (Cordell and others 1995; McIntyre 1995). This observation naturally begs the question as to the ability of visitors to achieve the values and benefits referred to by the nature writers, in visits of such short duration.

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- Current use of wilderness areas is marked by relatively high levels of activity (Cole and others 1995) or participation in structured outdoor challenge programs.
- Growth in the use of natural areas for nature-based, adventure tourism is characterized by an increasing tendency for visits to be packaged by commercial operators for visitors who have neither the time nor the energy to invest in acquiring the skills or planning the experience.
- Embedded within the commodification and commercialization of the wilderness experience is the growing use of high technology devices in wilderness, such as hand-held GPS (Global Positioning System) and cellular phones, four-wheel-drive tour buses, mountain bikes, and the constantly expanding area of extreme sports (bungee jumping and speed rock climbing) (Hollenhorst 1995). These developments, with their emphasis on safety, comfort, and security on the one hand and extreme risk, thrill, and spectacle on the other, represent a significant departure from the elemental simplicities of wilderness espoused by the nature writers (Leopold 1949; Marshall 1930).

This analysis of current wilderness experiences indicates that for the majority of natural area visitors, the reality of the modern experience may be quite different from the one they are supposed to have—if the nature writers are to be believed. It seems that, while we may know much about the myths surrounding the wilderness experience at the cultural level (Brandenburg and Carroll 1994), beyond this, we appear to know little about what people actually do and what holds their attention.

In summary, the characteristics of modern society raise some doubts about the likely achievement of the values supposedly arising from wilderness experiences. Is it likely that today's wilderness user, cocooned in fibrepile and goretex, on a brief (1 or 2 day) trip into the wilderness, feels oneness, humility, and immersion? If the aim is to understand the role of nature experiences in the lives of modern people, this review suggests that research needs to focus on the most common types of wilderness trips (such as those of short duration) and examine the process of the wilderness experience as it unfolds.

## Understanding the Wilderness Experience

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The majority of empirical data on the values of wilderness experiences has been derived from analyses of structured challenge and personal development programs (Hattie and

others 1997). Most of these studies have used a pre- or post-test design and have thus contributed marginally to the understanding of the process of the wilderness experience.

Two studies (Scherl 1990; Talbot and Kaplan 1986) departed from the traditional approach and used journals and diaries to examine the evolving wilderness experience as perceived by the participant. Scherl's (1990) study demonstrated that participants focused principally on self, in terms of activities and emotions, and on the social setting rather than on the natural environment. A somewhat different result emerged from the Talbot and Kaplan (1986) study, which demonstrated that participants seemed to focus more on the natural environment, and reported an increase in detailed observation of nature and expression of affective and emotional responses to these observations, with time in the wilderness. These studies indicate that the program content, particularly the character and level of activity, influence the predominant focus of the participant's attention. Such observations are particularly important given the high level of activity that seems to characterize modern wilderness trips and the centrality of passive nature contemplation in the development of nature appreciation.

Participants in outdoor recreation activities focus on the natural environment, among other things, such as tasks, other people, and self (Williams and others 1992). More recent work by Borrie (1995), based on the examination of the works of wilderness philosophers, has produced a series of indicators of aspects and modes of experiencing wilderness. Aspects of experiencing wilderness include "timelessness," "oneness," "primitiveness," "care," and "solitude," while modes of experiencing wilderness include "introspection," "social acceptance," "task orientation," "environmental awareness," and "leisure." Such indicators further refine the character of the nature focus in the wilderness context and provide insights to the extent of which these important aspects of the wilderness experience are achieved.

Hence, an increased understanding of wilderness experiences will result from the study of what people do in wilderness, what they focus on, and how they are feeling while they are there. In other words, perhaps it is only possible to understand what wilderness means to modern people by examining the multiphasic development of wilderness experiences in terms of the physical and social contexts in which they occur and the feelings which they arouse.

## Methodology

The above review suggests the need for a data collection process that is able to capture the unfolding of the nature experience in situ. The Experience Sampling Methodology (Larson and Csikszentmihalyi 1983) is suggested as one such approach. These data potentially provide a real-time and contextual assessment of the wilderness experience.

The Experience Sampling Method used here was developed by Csikszentmihalyi and associates (Csikszentmihalyi and Larson 1987; Larson and Csikszentmihalyi 1983) and involves detailed monitoring of respondents' daily behavior through the use of pagers that are activated by the researcher on a random basis up to 12 or more times a day. The Experience Sampling Method approach has the advantage

of providing a real-time report on environmental context, feelings, and activities, which does not suffer from the well-recognized deficiencies of other verbal reports (such as memory decay, reconstruction, socially desirable responses, mood, overgeneralization, and illusory correlation) (Borrie and Roggenbuck 1995).

In the present study, two scales were used in the Experiential Sampling Instrument: a focus of attention scale and a wilderness scale. The focus of attention scale was adapted from Williams and others (1992) and includes a differential rating of the degree of focus on task, companions, environment, and self. The wilderness scale used key variables from Borrie (1995) to assess aspects and modes of, experiencing wilderness. Both were rated on a 10 point scale, varying from not at all (0) to very much (9). Each respondent, when the pager sounded, was required to fill out a short questionnaire which focused on "where you are," "what you are doing," "who you are with," "your mood," and aspects and modes of experiencing wilderness.

Previous research suggests that the level of activity of individuals interacts with nature focus and nature appreciation (Scherl 1990; Talbot and Kaplan 1986). At the time of responding, participants were asked "What was the main thing you are doing?" and were expected to indicate nature-based activities, both active and passive, (such as walking in the bush, canoeing on the river, resting in my tent, and reading), and domestic activities around the camp, (such as washing dishes and cooking meals). This provided a three-fold classification of activity types that varied in character and intensity, namely, passive, active, and maintenance activities. Participants were paged between the hours of 8:00 a.m. and 10:30 p.m., with one signal occurring at random in each 2 hour block. In trials, it took approximately 2 minutes to complete the survey.

## Study Area and Sampling

Data reported in this paper were collected from people canoeing and camping on the Noosa River in Cooloolo National Park in southeastern Australia during June and July 1996. The upper reach of the Noosa River is one of the most outstanding areas for flat-water canoeing in southeast Queensland, with undisturbed natural landscapes on both sides of the river. Wilderness camping opportunities are provided at 15 sites along the river.

Throughout the period of study, weather conditions were fine, with warm sunny days and cool nights. The Noosa River provides easy canoeing on mirrorlike, tannin-stained waters overhung by melaleuca and eucalyptus. The surrounding lands are mainly heaths backed by easily accessible, high sand dunes that provide extensive views over the Pacific Ocean and the forested hinterland. Participants had visited the area before, some for many years, and were competent in flat-water canoeing.

Participants in the study were accessed through the Queensland National Parks and Wildlife Services permit system. Given the exploratory nature of the study, a purposive sampling approach (Neumann 1994) was used, and all permit holders during the 14 day period were approached to participate in the study. This resulted in a total of 13 respondents who provided 116 Experiential Sampling Forms.

## Results

### Sample Description

The respondents comprised 13 canoeists, most of whom were males (10). Ages ranged from 16 to 59, with the majority (8) in the 30 to 49 year bracket. All had visited the area previously and were familiar with the environment and with canoeing. Only four of the groups stayed out more than 1 night, with the maximum length of stay 3 nights. The average length of stay was 1.6 nights. In this regard, these trips could be regarded as a short stay. Individuals were in family or family-and-friend groups.

A total of 127 calls were made to participants. Of these, 116 provided usable returns. This response rate of just over 91 percent compares favorably with previous Experience Sampling Method studies of everyday life situations (Graefe and others 1983).

### Focus of Attention

Throughout the trip, participants focused quite a bit on, tasks (mean score = 5.3) and the natural environment (mean score = 4.5). In contrast, companions (mean score = 3.2) and personal thoughts (mean score = 2.6) were a lesser focus for participants.

### Wilderness Items

Analysis of the mean scores for the aspects of the wilderness experience items showed that the canoeists on average experienced timelessness “very much” and cared about the natural environment in Coolooloa National Park to a similar degree. They felt solitude and oneness “quite a bit,” and primitiveness only “somewhat” (table 1).

Generally, participants indicated that they were accepted “quite a bit” by their companions and considered the wilderness experience as leisure (table 2). They concentrated on the tasks at hand “quite a bit,” but were only “somewhat” environmentally aware (table 2).

### Wilderness Aspects, Modes, and Activity

The observation that modern wilderness trips are characterized by high levels of activity raises the question as to the extent to which the various values of wilderness experiences are achieved by participants during such trips. Relevant research (Scherl 1990; Talbot and Kaplan 1986) suggests that the level of activity interacts negatively with nature focus, and thus the likelihood of experiencing the values alluded to by the wilderness philosophers is reduced. This study set out to examine this question by sampling the activity type in conjunction with both aspects of wilderness experience and modes of wilderness experience, recognized by Borrie (1995).

Of the 108 completed returns used in the analysis, just over one-third were classified as passive (36 percent), 48 were active (44 percent), and the remaining 21 (19 percent) were maintenance. Multivariate Analysis of Variance and “post-hoc” Oneway Analysis of Variance were used to explore the relationships between the aspects and modes of

**Table 1**—Descriptive statistics of wilderness items: aspects of wilderness experiences.

Item	Mean score <sup>a</sup>	Standard deviation	Number of cases
I was not worrying about the time (timelessness)	8.30	1.57	116
I want to behave properly towards this place (care)	6.85	2.32	116
I felt the silence of the environment (solitude)	4.92	2.66	116
I was feeling totally immersed in nature (oneness)	3.52	2.54	116
I felt connected with times long ago (primitiveness)	1.82	2.84	116

<sup>a</sup>Scale values were from 0 = not at all to 9 = very much.

experiencing wilderness as dependent variables and type of activity (active, passive, and maintenance) as the independent or factor variable. Multivariate Analysis of Variance indicated significant relationships existed between type of activity and all of the aspects of wilderness. Whereas, only leisure, task orientation, and introspection of the modes of experiencing wilderness were significantly related. Post-hoc Oneway analysis provided greater insight on the magnitude and direction of the relationships that existed between aspects and modes of wilderness, and type and level of activity.

In most cases, aspects of wilderness, including care, solitude, oneness, and primitiveness, were significantly more likely to be achieved during nature-based or active pursuits beyond the campsite (such as walking or canoeing) (table 3). The one exception was timelessness, which was achieved in passive and maintenance activities significantly more than during involvement in nature-based pursuits. However, it should be noted that timelessness, even in this situation, was “very much” (mean = 8.85) achieved. Maintenance activities were least likely to facilitate timelessness, solitude, and oneness. And passive activities were least likely to foster care and primitiveness.

**Table 2**—Descriptive statistics of wilderness items: modes of experiencing wilderness.

Item	Mean score <sup>a</sup>	Standard deviation	Number of cases
Other group members were accepting of me for who I am (social acceptance)	6.37	2.20	116
I would call what I was doing leisure (leisure)	6.37	2.73	116
I was concentrating on doing my activity right (task orientation)	5.07	3.02	116
I notice the little things of nature more than before (environmental awareness)	3.39	2.74	116
I was reflecting about myself a lot (introspection)	1.98	2.31	116

<sup>a</sup>Scale values were from 0 = not at all to 9 = very much.

**Table 3**—Aspects of wilderness by level of activity.

Aspects of wilderness <sup>a</sup>	Passive	Maintenance	Active
	----- <i>Mean</i> -----		
Timelessness	9.72	9.52	8.85
Care	6.10	6.23	7.72
Solitude	4.69	3.57	5.69
Oneness	2.97	2.57	4.38
Primitiveness	0.92	1.71	2.60

<sup>a</sup>Scale values were from 0 = not at all to 9 = very much.

Being at leisure was most likely to be achieved during active and passive activities and least likely while undertaking maintenance (table 4). Task orientation, on the other hand, was most likely in active situations and when engaged in campsite duties. Activity also seemed to promote introspection, whereas passive and maintenance activities were less likely to encourage introspection.

## Discussion

In summary, the data suggest that of all the activities pursued during the trip, active pursuits (such as canoeing and walking) were the most influential in creating a sense of leisure and promoting the values that have been ascribed to wilderness experiences by the nature writers. This study raised the issue of the effect that changing societal conditions might have on the reality of modern wilderness experiences, characterized as they are by relatively short duration, the trappings of modern technology, and the emphasis on activity and socialization.

These trips were indeed short (though mostly overnight), and task—whether campsite duties or active travel in the natural environment—was the predominant focus of attention for participants. It appears that these trips are typical of modern wilderness trips as suggested by a number of authors. However, focus on companions and self were rated much less important by participants than either task or nature focus. The former may well be a reflection of the characteristics of the groups that were mainly family or family and friends. This observation is further reinforced by the high value given to social acceptance (table 2). Lack of focus on self may arise from familiarity with companions and comfort with the skills required to live in and traverse this relatively benign natural place. Again, this is supported

**Table 4**—Modes of experiencing wilderness by level of activity.

Modes of experiencing wilderness <sup>a</sup>	Passive	Maintenance	Active
	----- <i>Mean</i> -----		
Leisure	6.28	4.67	7.19
Task orientation	3.82	5.81	5.77
Introspection	1.31	1.35	2.79

<sup>a</sup>Scale values were from 0 = not at all to 9 = very much.

by the low value given to introspection (table 2). It seems that these wilderness trips, despite the focus on task, and short duration, and perhaps because of the lower emphasis on companions and self, provided the opportunity to focus on nature.

Care (such as, “I want to behave properly towards this place”) attracted the highest rating, and as it represents a relatively enduring characteristic, this valuation was likely derived from the previous association of participants with the Noosa River. Feelings of timelessness, solitude, oneness, and primitiveness would seem to have to be renewed on each occasion and may, therefore, be to some extent time dependent. The data suggest that timelessness is achieved to a greater extent than any of the other values. Perhaps, the digital world of the lived reality outside wilderness provides so stark a contrast that it is easy to slip into a sense of not worrying about time, if only briefly.

Solitude is achieved “quite a bit” ahead of, but in the same broad category as, oneness. It seems that even on these short trips, it’s still possible to achieve a sense of being isolated and to get in touch with the natural environment. The United States Wilderness Act of 1964, which has been a model for the development of wilderness legislation in some states in Australia (including Queensland—Nature Conservation Act of 1992), places a very high value on primitiveness. However, this value seems hardly achieved by these participants. It may either be relatively unimportant to these visitors or it may simply be unachievable in such short trips, due either to the need for more extended time or to the trappings of technology which accompany the modern wilderness visitor.

Writers and philosophers who spend extensive periods of time in wilderness place high value on passive contemplation as a key ingredient in getting in touch with nature (Sack 1980). What research there is seems to support this contention given the negative effects of high activity level on nature immersion (Scherl 1990). However, data from the current study apparently contradicts this tradition in that the wilderness values seem best achieved during low-key, nature-based activities rather than in passive activities. Participants seemed to spend most of their passive time resting, reading, or just sitting. Even introspection was most highly achieved during nature-based pursuits. This suggests that if the natural and social context is minimally stressful and participants are well versed in the necessary travel skills, active engagement in natural surroundings is facilitative of the achievement of the majority of wilderness values, even in trips of relatively short duration.

## Implications

Overall, the study suggests that wilderness values may be achieved to varying degrees in trips of short duration. The one major exception was primitiveness. As this is a major goal of Wilderness Legislation worldwide, this particular aspect merits further consideration in research. Is it simply that the single item (“I felt connected with times long ago”) was inadequate or inappropriate to capture this complex concept, or is this no longer a valued outcome for modern wilderness users? Alternatively, it could be a matter of immersion and that more time is needed before such feelings can arise in participants.

Advocates of the "Friluftsliv" (Outdoor Life) tradition in Scandinavian countries argue that technology separates the modern adventurer from free nature and we need to return to simpler traditional ways to meet nature on its own terms: "a prime concern... is to distinguish between the attempts to conquer wild nature... by force, equipment or support and to try to meet free nature and keep yourself dry, warm and happy in cooperation with, and to a large extent thanks to, nature" (McIntyre and others 1995: 181). This tradition calls for the abandonment of the high technology approach to outdoor recreation and wilderness that increasingly characterizes modern wilderness visits (Hollenhorst 1995) and encourages a return to a low-impact, minimal-equipment, and low-technology approach. Under such conditions, primitiveness becomes a core concern and specific goal of wilderness visits. If such an outcome is indeed desirable, wilderness managers and outfitters need to consider both the level of technology advocated in the name of safety and comfort in current wilderness use, and the ways in which low-technology alternatives may be provided to users.

Because many current wilderness experiences appear to be characterized by high levels of activity of similar intensity to that which is typical of the normal lives of modern persons, it is likely that wilderness values are not being achieved in many situations. The data from this study suggest that wilderness values were approached more through low-key, nature-based activity rather than through passive activity. Perhaps this is an indication that activity in itself is not necessarily detrimental to the achievement of wilderness values, but that the characteristics and context of the activity are crucial.

There appears to be little room for goal-oriented behavior in terms of destination and distance. Maybe it is not collecting the "honeypots" that is so important, but rather what is seen and experienced along the way. Wilderness visitors need to slow down, take time to enjoy and become immersed in wilderness, let the ends arise in the fullness of time, focus more on the journey than the destination, create a base camp and learn to linger, let go of control and itinerary, and allow circumstance (wilderness) to dictate the experience. To the extent that managers and outfitters can influence visitor decisionmaking on the character of the journey, it seems that information and advice could be crucial in enhancing opportunities to experience the core values of wilderness.

Certain structural and policy factors potentially interfere with the wilderness management system's ability to deliver such advice. For example, in the Boundary Waters Canoe Area Wilderness (the most heavily visited Forest Service wilderness in the entire United States), the reservation system has recently been turned over to a private contractor over 1,000 miles away. Such advice and information, which materially influence the character of the wilderness experience, is too important to cede to distant "reservation clerks" more used to booking hotels than facilitating experiences. More generally, the policy of moving park staff at fairly frequent intervals militates against the availability to visitors of an accessible onsite source of intimate knowledge of the particular wilderness. In combination, these factors fail to recognize the central role that wilderness managers can play in advising new, and even experienced, visitors on itineraries, distances, and camping places.

In addition, permit and other allocation systems should be scrutinized to assess their impact on visitor choice of pace and flexibility. For example, on the Milford Track, one of the most high profile walking tracks in New Zealand, walkers are required to maintain pre-set itineraries, including overnight hut stays. Such a policy, while increasing the capacity of the Track, may also act against the achievement of the very values for which the Track was set up.

If such policies are to persist and be expanded, the role of local outfitters in providing information and advice and in leading trips becomes even more crucial than at present. Similarly, to encourage a more contemplative activity approach to wilderness, interpretive and informational materials should emphasize the journey and the alternatives as much as providing necessary details of campsite location, safety, and travel times.

## Conclusions

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Wilderness trips are changing; they are more active, shorter, and more comfortable. Despite this, it seems that almost all the traditional values of wilderness are achievable, at least to some extent. However, neither passive contemplation nor high activity and challenge appear to be the road to nature appreciation. In the former, because people do other things than focus on nature when passive, and in the latter, because social and personal priorities are too urgent a concern. Active participation in pleasant, unstressed travel with comfortable companions in benign natural settings are perhaps the answer to the achievement of wilderness values and the benefits arising therefrom.

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# Reflections of Wilderness and Pike Lane Pond

David Reason

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**Abstract**—This paper explores the nature of human beings' feelings about the "natural world" in general, and about "wilderness" and the "wild" in particular. The argument is that the very objects nature and wilderness are themselves precisely the objects of emotions and constituted in relation to feelings. Emotions are themselves culturally and historically variable. This leads to the view that wilderness has an irreducibly emotional quality.

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I am moved by art and I have feelings in the face of nature. There is nothing unusual in this, yet it is nonetheless surprising and puzzling. It is, perhaps, relatively easy to see why we might have feelings in relation to persons, for without the spurs and pricks of emotion, it is difficult to see how we could conjure desire from mere mechanism or enmesh ourselves in the poignant ties of human relationship. Feelings represent themselves to we civilized beings as more or less primitive; that is, however tutored and refined, they are fundamentally derivatives of archaic and early affect, the bedrock of what J. G. Ballard has called "the spinal landscape" (Greenland 1983). This inheritance can be explained in terms of evolutionary advantage, no doubt, as being an element conducive to adaptive learning for members of the species; and to fulfill this role, we might suppose that the scope of application of emotions should be effectively unlimited. And yet, as a matter of experience, just as we can be astonished at the variety of objects, events, and situations that arouse emotions in us, we can also wonder at the range of events that do not.

These remarks indicate the terrain I wish to explore in this paper. My principal conclusion will be that we have feelings about things insofar as we construe them as like persons, and at this end of the millennium, psychoanalytic thinking disposes us to suppose that we humans personalize everything that can be an object of human feeling. Freud set this fashion, of course, by insisting on the "scientific coherence" of rigorously treating the unconscious as a person (and it is in virtue of doing so that the unconscious is revealed as a dynamic unconscious). In our own day, it is sharply modish to extend this courtesy to cultures (the precedent here being Freud again), to ideologies (for example, Samuels on environmentalism) (Samuels 1993), and to academic disciplines (Ian Craib puts sociology on the couch) (Craib 1997).

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## On Ponds

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When I was a child, weekly trips to the Public Library with my mother or father would end occasionally with feeding the ducks on the pond. Enjoyable as this was for me, I was also aware of a slight unease at the domesticated quality of the setting (the grounds of a large house, once private, and now municipal), of the participants, and of the scenario. But I craved wildness, a nature untamed and streetwise: I found it in ponds.

On the warm, sunny summer afternoons of school holidays, I would go pond hunting in the company of my school friend, Ron. He would push me in my wheelchair down (always down) Pike Lane. We would be properly kitted-out with jars, lenses, and painstakingly constructed nets made from an old pair of my mother's stockings.

Pike Lane pond is actually quite small, but in memory it has a vast extent. It was probably a farm pond once before piped water provided an alternative means of slaking the thirst of cattle. England was once littered with such ponds: farm ponds, dew ponds, fish ponds, village ponds, and duck ponds.

Oliver Rackham, the pioneer historian of the English countryside, uses the term "pond" to cover "depressions, natural or artificial, with water in them for most of the year" (Rackham 1986). He estimates that in England and Wales in 1880 there were about 800,000 ponds, or 14 ponds to the square mile. As Rackham observes, "countrymen love to theorize about holes in the ground and to attribute them to human or supernatural agency, calling them 'marlpits' or 'Devils Punchbowls'." Unsurprisingly, in our more cynical discourses, reality is considered more prosaic.

Besides providing drinking water for livestock and fish larders, ponds have been used for many industrial purposes. The commonest are generally connected with textiles: retting flax and hemp and beavering (a fermentation process that produced the dye of that name) woad. Retting involved steeping the plant in water to rot the soft tissues and leave the fibre—hence the hemp pits of England (the mud of some ponds contains prodigious quantities of *Cannabis* pollen) and the flax pits of Northern Ireland. These processes, messy and noxious as they were, were the subject of anti-pollution laws as early as the 16th Century. Rackham quotes the following bylaw from Dedham in Essex:

Item. If any manner of persons within the Towne of Dedham have any beaver pits at their woad houses against the common brook, they shall always be kept cast, so that the thick paste be kept out of the said brook, from noying of the common water. (Rackham 1986: 348).

In 1974, there was a campaign in Britain to "Save the Village Pond," which attracted a great deal of publicity and drew attention to the accelerating rate at which open, free

water was being lost in the countryside. There is a measure of romantic nostalgia mobilized to fuel such campaigns—always—but it is prudent to bear in mind that nostalgia has a double aspect. It is undoubtedly a regressive pining for an inconsolable and irremediable loss, and as such is readily seduced into sentimentality. However, it also points to the existence of difference, and in that space that opens up between the now and the then appears the recognition that things do not have to be as they are for us. All analysis is based in comparison, and nostalgia is sometimes a kind of soured analysis that may yet ferment into criticism.

One of the more curious alliances of the last 10 years has been that between the United Kingdom's Central Electricity Generating Board and local education authorities. This Board has established, at more than 10 of its local stations, educational Environmental Resource Centres. We have one near where I am sitting, here in Canterbury. Just off the Sturry Road and on Central Electricity Generating Board land adjacent to monstrous pylons is the Kent Environmental Resource Centre, consisting primarily of a series of linked minilakes, each a flooded gravel working. They have now more or less naturalized, and provide an engagingly calm and secure area for a wide variety of wildlife—birds in particular. However, a principal activity of the visiting school parties is—as I was pleased to note, with a wry thrill of nostalgia—pond dipping. Children still love to crouch at the waters edge, trawling for the otherwise almost unnoticed wriggling things of the pond. If the pond is an emblem, it is an emblem of second nature.

My most constant companion during those sunny days of pond dipping was John Clegg's excellent little handbook, "The Observer's Book of Pond Life" (Clegg 1986). That text has been through at least four editions since my 1950's childhood, and has never been out of print—testimony to the continuing fascination of ponds. Where does that fascination derive from? From my own observations, people of all ages, genders, and classes gravitate to a pool of water; and in my own gardens (front and back), in each of which is a small pond, I have noticed that the pauses in conversation drift most congenially when by the pondside.

I am sure that the special thrill that I experience near a pond is in part idiosyncratic: I have a luminous memory of being buoyed up in a forest pool as a young boy convalescing from polio, in the arms of my favorite physiotherapist. With only the slightest refocusing of attention, now, I can smell the water, feel the slight tug of its surface at my cheeks, look along the rippling light of a surface that dissolves all dimensions, and see the winking and glowing backlit leaves of the tree canopy.

Clegg characterizes a pond as a small and shallow pool of stagnant water, and identifies its characteristic animal life as consisting of the small (often microscopic) animals of depths and the mud. This does not sound appealing, and hardly promises either the vivid dramas offered by television wildlife programs, nor the transfigurative powers of spring water, which as Bachelard (1983: 152) reminds us, is everywhere revered.

Pond water, in comparison, has a veiled attraction. Clegg is right: ponds stagnate, that is, unfold their being without a change of water. If clear and sweet today, you may be sure that before long the water will be cloudy and its surface scummed and slicked with algae. A proper pond has no

business trying to conform to our human, cultural prejudices of order and cleanliness, and even the meanest pond should rank with the rank. In any case, though, the pond will be apt for reverie, its surface the analytic mirror that takes all reflection back to childhood and, perhaps, the inconsolable loss of childhood's milk. Bachelard surely wants us to see it that way, invoking John Cowper Powys in evidence:

That particular intonation of the blackbird's note, more full of the spirit of air and of water than any sound on earth, had always possessed a mysterious attraction for him. It seems to contain, in the sphere of sound, what amber-paved pools surrounded by hart's-tongue ferns contain in the sphere of substance. It seemed to embrace in it all sadness that it is possible to experience without crossing the subtle line into the region where sadness becomes misery (from "Wolf Solent," quoted by Bachelard 1983: 193).

However, the pond also demands another attitude, not that of the analysand but that of the analyst, for it seems to reward with interest a kind of free-floating attentiveness. It is not by chance that for many of us pond life serves as the first and most sustaining nature study. The pond reveals itself as a complex of zones and habitats to even the untutored eye; the interrelationships of forms and substances and plants and animals—and, crucially, of the interdependence of visible and invisible worlds—is manifest after the most idle hour by the water's edge. Given but the laziest eye, the imagination may yet be fired by the dramatic ironies of water: by the curious indifference of pond skater to water boatman, for example, the one tip-toeing the water's tensed skin as it patrols, the other vigilantly suspended from the underside of that same molecule-thick and invisible membrane.

Clear sightedly, Thoreau never describes his period living by Walden Pond without an eye to the place of man in complex interdependencies. He represents his "idyll" as an attempt to live open to, and cognizant of, the "essentials of life," and what he began on July 4, 1845, resulted in the publication of "Walden" itself some 9 years later:

A lake is the landscape's most beautiful and expressive feature. It is earth's eye...Nothing so fair, so pure, and at the same time so large, as a lake, perchance, lies on the surface of the earth (Thoreau 1971: 186, 188).

Thoreau's ponds (his is the American usage, which allows the term to apply to larger sheets of water than the English are accustomed to) were probably glacial in origin—kettleholes. They were without inlets or outlets, deep and clear and with sparse vegetation. They were involved in the lives and deaths and births of a variety of animals—fishes, mammals, waterbirds, and amphibians are all mentioned. Their ecology is probably quite different today. With no means of flushing out poisons, the industrial development already underway in Thoreau's time is likely by now to have ensured a mounting toxicity for these "gems of the woods"—death traps, indeed.

One commentator, Daniel Peck (1992), has argued that Thoreau was well aware of the tension between an ahistorical idealization of edenic nature, on the one hand, and the sheer and overwhelmingly practical contingency of history, on the other. He draws particular attention to Thoreau's survey of Walden Pond of 1846, in which the southwestern

tip of the pond is represented as being but a spark's gap from the railway, which itself is almost an osculating tangent to the neo-Platonic geometries of the pond. Part of the book's interest to me results from this industrial accent, from Thoreau's palpable awareness of the historical situatedness of these ponds of tranquillity:

I have said that Walden has no visible inlet nor outlet, but is on the one hand distantly and indirectly related to Flint's Pond, which is more elevated by a chain of small ponds coming from that quarter, and on the other directly and manifestly to Concord River, which is lower, by a similar chain of ponds through which in some other geological period it may have flowed, and by a little digging, which God forbid, it can be made to flow thither again. If by living thus reserved and austere, like a hermit in the woods, so long, it has acquired such wonderful purity, who would not regret that the comparatively impure waters of Flint's Pond should be mingled with it, or itself should ever go to waste its sweetness in the ocean wave (Thoreau 1971: 194).

"I would...fish in the sky, whose bottom is all pebbly with stars." Of course Thoreau noted—but in condensed fashion, pregnantly—what all pond watchers know: that the deeper you look the higher you see. Visually speaking, all ponds have three depths: there is the depth of the surface, the skin or film of the pond; the depth of the volume of the water itself, into which we peer for signs of the life within and, perhaps, a glimpse of the bottom (but this is rare); and looking deeper still we see the sky.

It is clear that so far as this history is concerned, feelings for ponds—mine as much as others—are contingent upon something that I conceive to be an inhabitation by persons. However mediated, the feeling for ponds flocculates in an intercourse with the world.

Secondly, it is commonplace for the human intimates of pond life—and, correlatively, of pond livelihood—to mark them as "containers" of human meaning. Not only do ponds arise in the folk imagination as the work of gods, for example, but they are also more mundanely the product of our unremarkable purposes; and yet, for either and each, the pond stands as a reserve of moral dimensions, of sweet and foul, the cleansing and the corrupting.

Thirdly, instrumentality itself, in its guise of the taken-for-granted habitus (Bourdieu 1977) of skilled practical action—the praxis of pond worlds, as it were—carries a freight of understanding of that world and of humans' places and relations in it. This may be an uncritical understanding, but it is a ready-to-hand and fitting understanding, good enough in most respects most of the time. ("Good enough" here indicates a quality of not jeopardizing the success of reproduction of that world as a world in which people have a place.)

## Human Relations to the Natural World

Einarsson (1993) writes of an encounter between a fisherman and a minke whale that in another's voice might be redolent of the glancing contact of different spirits:

One late afternoon...I met an older fisherman who was returning from his daily trip. I helped him tie up his small boat and asked whether he had any luck with the fishing.

He said no, the sea had been totally 'dead', except for fish he was not interested in. When I asked him what he meant by that, he told me that, as he had been sitting with his handline, a minke whale had suddenly appeared, circling round the boat and diving under it. Then after a couple of minutes, the whale came swimming right up to the small boat, apparently watching the man. 'I could have touched him with my hand,' he said. The whale stayed in this position for a couple of minutes and then left. The fisherman had never seen a whale do this before, but he was not very impressed and not even particularly interested in telling me about this incident (Einarsson 1993: 76).

Where there is no interest, neither is there engagement or wonder. The fisherman is—as fishermen are the world over—content with his fixation in a partial relation with the natural world.

Now, we are familiar with this kind of attitude; it is ours, too. We find no special problem in supposing that our relations with the natural world, the environment, the wilderness—the litany doesn't stop there—are informed with the inscape of economic concerns. Why, then, might we suppose that some other peoples have a more harmonious, full, and undifferentiated commerce with the world?

Nurit Bird-David is one of a number of anthropologists who have tried to discern an underlying order to the metaphors by which we live out our relations with ourselves and our worlds. In a recent contribution (Bird-David 1993), he explains four thematizations of this relation, which he calls those of "sexual relatedness," of "procreation," of "name-sake," and of "adult-child caring." An example of the name-sake trope is found among the !Kung or San people who now live in the Kalahari of South Africa. They have a domain-cross-cutting, name-identification practice that Western anthropologists have been comfortable in calling "totemism," but which Bird-David believes is better thought of as a "medicine complex." In this, like-named individuals can assume each other's kinship identity, with all the rights and obligations, permissions, and privileges that go in train with this. However, the complex ramifies further:

...the medicine complex is essentially about pairing people, dances, songs, and medicines with details of the natural environment such as eland, giraffe, mantis and rain. The eland, for example, links with the people of the eland, the eland-dance, the eland-song and the eland-medicine, while rain connects with the rain-people, the rain-dance, the rain-medicine and the rain-song.... The sharing of names is associated with a certain kind of potency called *n/um* (in the !Kung vernacular) which all constituent parts of the system are believed to have (Bird-David 1993: 117-118).

Once an individual's *n/um* is awakened—literally, "boiled"—it can be used to enable that person to assume the form of their natural (and supernatural) name-sakes' relatives, to occupy their position, and generally, to draw upon their power. One expression of this: an anthropologist was told that the medicine men of the eland could see what the eland saw and thus knew the whereabouts of the eland (Bird-David 1993: 118).

The namesake thematization is one that guarantees a cultural relation to the natural world that is as partial and as complete as is the relationship between men and men; it is, in other words, situated, occasional, and tendentious.

Or, to put this slightly differently, the abstracted cosmology that we infer from the situated utterances of the San (and like people) presents itself as universal and totalizing.

Ellen (1983) deploys information from more than 20 years of detailed fieldwork with the Nuaulu of Seram and infers that from the Nuaulu, conceptual engagement with the forest can be distilled in four dimensions:

*Forest is a complex categorical construction:* uncut forest (*wesie*) is recognized as a single entity, but contrasts in different ways with *wast* (owned land, which may nonetheless display mature forest growth), a jural distinction; with *nist* (garden land), marking human interference; or with *niane* (village), emphasizing contrasts of empty versus well-timbered space, of inhabited vs uninhabited space, of tamed vs untamed space. (These senses of 'forest' correlate with, but are not homologous with, Western concepts of 'wilderness'.)

*Forest is not homogenous:* *wesie* is not regarded as homogenous, but more as a mosaic of resources, and a dense network of particular places each with its own material values.

*There is an inner connection between history, identity and forest:* the Nuaulu conception of their environment is something like a series of points to which particular clans and individuals are connected, fixed points in an unbounded landscape linked to their appearance in myth, and supporting a use of land which is at every turn inseparable from specific sacred knowledge, which is sometimes mutually contradictory and obscure, though never absent.

*Forest is a moral construction:* from the merging of practical usefulness, mythic knowledge and identity in the category *wesie* comes a sense of right and wrong ways in which to engage with forest, arising in part from the specific social histories of parts of it, but also from its intrinsic properties—for forest is unpredictable, dangerous and untamed, albeit there are techniques and practices aimed at controlling it (Ellen 1993: 139: my emphases).

Everywhere and always, human beings' discursive relation to the natural world is thematized through tropes and metaphors that govern the possibilities of intelligible representation of those relations. The natural environment serves as a screen on which we may project our fears, thrills, thralls, and ecstasies. Equally, the rhetorical resources of "relations with nature" provide for an idiom in which to represent oppositional identities.

The boundary maintained between nature and humanity can stand for all boundaries, all separations, wished and unwished. There inevitably arise issues of control and of the policing of frontiers—and here the seeming body's inside and outside too readily maps me versus environment onto human versus nature. Nature, too, is vulnerable and at risk if we perceive ourselves to be so.

In summary, we might say that nature is always and everywhere a sedimentation of human cultural practice. Current anthropological scholarship identifies skilled practice as a critical but unarticulated ground for rendering humans' relations with the world. Skilled practice is a form taken by embodied knowledge. For Tim Ingold, for many years a student of the Sami people of Lapland, this skilled practice is intuition, and he even goes on to suggest that the characteristic tropes of the kind identified by Bird-David represent truths of practice. Where Bird-David sees a sexualized relationship expressed in the Cree conviction that the

culmination of a successful hunt finds the quarry "offering herself" or "being seduced" by the hunter (Bird-David 1993), Ingold finds in the Sami equivalent an allegory of ecological insight, based upon an extension of the potential prey's differential speed and stamina in the chase that typifies its life-chances, namely, confrontation with wolves. Nature, culture, and environment—these can be taken to stand for the interests informing and informed by three different points of view from which we generate aspectual pictures of a complex entanglement of relations and processes.

## Conclusions

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Where the complexity of the human relation to the natural world is simplified into a contrast between nature and culture, or wild and cultivated, then this stark differentiation readily mirrors other dualities (male or female, for example, or sane or mad). Vigilant policing is needed to secure the boundaries between these conceptual and cultural territories, and there tends to be not only a polarization of sentiments for the territories themselves (such as wilderness is good, civilization is bad, or vice versa) but also an emotional investment in keeping separated things separate. Correspondingly, there is a low tolerance for uncertainty, ambiguity, ignorance, and impotence.

Feelings and emotions are historically conditioned and culturally shaped. The recognition and display of emotion is bound up with notions of technique; it is mistaken to think of feelings as primitive, wild, or unruly, and reason as mature, temperate, or disciplined. The relationships between subjective and objective worlds are negotiated via judgments of the appropriateness of emotional experience to the circumstances that occasion it. How we feel about wilderness reveals something about our social relations with the natural world and about our relations with each other.

We care about wilderness—whatever that is. We may fear it, be overwhelmed by it, be tenderly concerned with reparation for the damage humans' way of life is deemed to cause it: in any case, we are not indifferent, we care. Perhaps, to do the good thing for wilderness we should feel the right way toward wilderness. Scientists argue for dispassionate investigation, where artists, through their work, seek to move people and to alter how we feel about the subject of their arts. This is a simplification, of course, and even a caricature of that simplification, but it serves to point up the tension that we often feel to exist between mind and heart in the pursuit of effective care. Clear sightedness is not emotional, for the tears distort our vision: thus the advocates of science. However, to wholeheartedly embrace that view is to ignore the evidence of actual passion in the pursuit of scientific knowledge, and overlook that there is a commitment to certain values before scientific activity can get underway. Science is passionate about being dispassionate, partly because this enabling value cannot be rationally defended without logical inconsistency.

If we are to understand our relationships to wilderness, we must understand the nature of our feelings toward wilderness and the way in which emotions are implicated and entangled in those relationships. One strategy that is open to us is to look more closely at art, and this for two reasons. First, artists, insofar as they can construct objects

and events that move us emotionally, can be regarded as technologists of feelings—emotion engineers. Since art works are the products of human activity, we may be able to understand better what is involved in the human propensity to invest emotional value in objects. Secondly, art works (the most indomitably individual art works) share something of the qualities of our dominant characterizations of the objects of the natural. This can be expressed in the aphorism that art is purposed purposelessness. The artist brings about objects that are, like nature, just there, and they too, may move us.

There are identifiable artistic techniques for producing the emotional tingle that we associate with being in the presence of something full of meaning yet whose meaning seems to elude us, appears to be beyond us. These techniques are concerned with matters of potency, of boundaries, and of coherence. This structure of aesthetic technique corresponds to the areas of primary anxieties recognized by some psychoanalysts, particularly those who endorse a version of Kleinian theory. In this view, we structure our emotional relationships with the world—indeed, we structure our world—out of our attempts to (psychologically) survive the threatening anxieties that date from the baby's first weeks. The tactics for the production of an art that moves us turn out to have an intimate and uncanny connection with the human being's primary matrix of psychological defenses.

In the realm of the emotions, art does not copy nature, nor does nature copy art. Rather, art and nature name culturally and historically given sites where human beings can put the objects that are fashioned in response to their complex emotional dynamics. These objects are not things, but are the objects of our feelings, and they are as much conjured and projected as they are pre-existing. The external world is indeed objective, a phantasmagoria of entities invoked to bear our feelings.

Wilderness is one such entity. Wilderness has no status except in relation to our emotional life as a domain that can

receive, hold, contain, reflect, and threaten. We do not so much need to understand the form and nature of our emotional relationships with wilderness, as to recognize that the nature of wilderness is itself formed from our emotional being. If science, in particular, should lose sight of this, then it loses sight of its object, also.

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# The Role of Wildlands in Sustaining Communities and Economies and Vice Versa

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**Abstract**—This paper is about wildlands—beyond legislated Wilderness areas. It's also about communities of people, their economies, knowledge, foresight, and courage to sustain the wild character of landscapes in a region, and the human cultures associated with them. Our premise is simple: wildlands do not all have to be developed to serve human well-being. It has a corollary: human communities and economies must be reasonably healthy and prosperous to sustain wildlands in an untrammled (unmanipulated) condition.

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Let's start with some definitions. First, what are wildlands? A universally accepted definition of wildlands does not exist, but most people would agree that wildlands are places where the imprint of man is not dominant, for example, they are not shopping malls, suburban residences, farms, or developed recreation sites. They are relatively undeveloped landscapes that might include classified Wilderness areas, nature reserves, lands that do not have permanent roads suitable for vehicular access (trails and paths might be present), and areas where the evidence of human use or manipulation is visually and ecologically subordinate to the natural landscape. Wildlands are often referred to as backcountry or primitive areas and are generally the remnants of vast landscapes that were once entirely wild but have now been transformed by human action. These wildlands might be lands that were once lightly homesteaded, previously under slash and burn agriculture, perhaps had some timber harvested over low-standard roads, or were grazed by domestic livestock but have reverted to wildland condition as time passed. Please note that our definition of wildlands does not mean that these landscapes do not have people living in them or using them in some ways, only that human presence is not visually or ecologically dominant.

Wildlands in most of the world are often preserved in some form of public or State ownership such as National Forests, National Parks, wildlife refuges or sanctuaries, or crown lands. Some privately held lands in some countries do

contribute to the wildland estate or might potentially be converted to wildland conditions through management techniques such as road obliteration and reforestation. Such lands, however, must be permitted to regain their wildness over time, a process not easily accomplished once the human signature is written with such permanent features as paved roads and hardened facilities.

Wildland preservation, conservation, and protection tend to be products of an affluent society, one that is able and willing to recognize the long-term contribution such landscapes make to societal well-being. In some cases, State-declared wildlands are born and retained through tumultuous debate and conflict between competing economic and social interests. Other wildlands arrive at their status because they were vast, remote, awe-inspiring, or economically inaccessible to the flow of economic growth. In these cases, the resources of the "front-country" were sufficient to meet the country's needs for the moment, thus retaining wildland remnants as a storehouse of future options. Until this past century in most countries, these wildlands were intended to be developed for economic gain but people just hadn't gotten around to it yet.

## Wildlands in the Western United States

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Such was the case with the wildlands of the American West, and in particular, the Northern Rockies. The Rocky Mountains had only American Indian residents when the Lewis and Clark Expedition journeyed west through the region in 1805 and traversed back in 1806 (Ambrose 1996). All lands were essentially wildlands under our definition, home to numerous tribes and cultures. By the mid-1800's, mountain men, fur trappers, and trading companies had established a scant presence in the region. A few missionaries, priests, and settlers followed. Then, in just 40 short years, by 1890, historians considered the western frontier to have closed (Turner 1920). Between prospectors, post-Civil War immigrants, cattlemen, and homesteaders, the region had been discovered and was producing commodities. It was being developed and converted from wildlands into settled lands. Stagecoaches were being replaced by roads and railroads. Towns and cities were growing. Mines were producing gold, silver, copper, and coal, and lumber companies were on the move from the Lake States region, across the country to the Pacific Northwest. In our mythology, the giant logger Paul Bunyan and his blue ox, Babe, were heading for the ocean, cutting all the forests in their path.

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Slowly the wildlands of the United States were largely tamed. The once-great herds of bison, numbering in the millions up to 1860, were shot to near extinction by 1880. The Indians were sent to reservations and forced to change their way of life. The great, silver-tipped grizzly bear and timber wolf were shot, trapped, and poisoned into submission by the early 1900's. The beaver was nearly trapped out of existence, and eagles were shot while soaring above the large bands of domestic sheep. Meanwhile the prairie sod became grain fields and the valley bottoms became ranches. Eventually the wild waters of the mighty Columbia and Missouri Rivers were dammed for commerce, irrigation, flood control, and hydropower, at great cost to the native diversity of fish and wildlife associated with the once wild waters.

Thus was the way of the wilderness in the Northern Rockies, a story that had played out decades and centuries before in other parts of the nation and the world. But it was a story that had not even started in other places, such as Amazonia, and it would not be finished here in the Northern Rockies.

## Preserving Wildness

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Representing the most primitive portion of wildlands, "wilderness" is a word whose original meaning is "place of the wild beast." In its historical context, wilderness was a wild place, a savage place, frightening and mysterious. It was a place beyond the safety of the village, fictionalized by reporters and novelists who portrayed it at best as uncivilized and at worst—evil.

But, while this mainstream view of wilderness prevailed in the American West, there existed in a few people the notion that wilderness and wildlands might not be all that evil or uncivilized, and that they could have value for reasons other than economic development. To early American writers such as George Perkins Marsh, Ralph Waldo Emerson, Henry David Thoreau, and John Muir, natural landscapes were important as contrasts to developed lands. Such places were vital to the human spirit and possessed an intrinsic value. Other authors, poets, photographers, and artists began to write about wildlands and preserve their images. The romanticism over wildness grew and so did the call for conservation and preservation of the favored mountains and scenic valleys.

In the 1870's, the United States began reserving special places as state and National Parks, then later as National Forests and wildlife refuges. By 1897, the U.S. Congress articulated its concern for the great western forests by passing the Organic Administration Act to set management direction for the newly declared forest reserves. Several Presidents continued to establish forest reserves in the Northern Rockies during the next 10 years. By 1905, the ties of the Department of Interior were transferred to the Department of Agriculture. The mission of the new agency initially was largely a custodial one, protecting the forests from fire, ensuring favorable conditions of water flow, controlling the cutting of timber, and managing domestic livestock grazing. By 1916, the National Park Service was formed, with a mission to attract tourists to the nation's scenic wonders and to protect these places from undesired developments.

As settlement continued in the West, and towns and cities grew, the need for forest products increased—principally wood, minerals, livestock forage, water, and recreation. Roads and railroads penetrated the virgin valleys and mountain ranges. The Forest Service and National Park Service both encouraged these developments, as well as strove to maintain the essential wildland character of the landscapes under their jurisdiction. But the drive toward development in the early 1900's brought forth new and stronger voices for protection of the wilds. In the Forest Service, Arthur Carhart, Aldo Leopold, and Robert Marshall became advocates for managing some land areas without roads or facilities to perpetuate amenity values such as backcountry recreation, scenery, and preservation of natural conditions. In 1924, the first National Forest Wilderness, the Gila in New Mexico, was administratively designated through the insistence of Aldo Leopold. In 1935, The Wilderness Society came into existence to advance the national cause of creating and preserving wild places. They joined voices with the Sierra Club, frequently skirmishing with commodity interests over the future of particular tracts of public land. Battles were fought with timber, mining, water development, grazing, road, and development interests. With a passionate and eloquent voice, these visionary men raised the consciousness of a growing cadre of agency professionals and citizens to the value of wild places for watershed protection, wildlife habitat, ecological wholeness, outdoor cathedrals, and personal rejuvenation.

Robert Marshall, the first Forest Service Chief of Recreation, actively pursued his Wilderness, Wild, and Recreation Area agenda by establishing the "U" regulations in 1939. Under these regulations, many remote, superlative wild areas of the National Forest System were classified, including the "flagship" of today's National Wilderness Preservation System, the Bob Marshall Wilderness Complex of Montana.

As management and development of the National Forests intensified after World War II to meet growing human needs, so also did disputes escalate over the disappearing roadless regions. By the mid-1950's, The Wilderness Society, and its energetic director Howard Zahniser, were calling for a National Wilderness Act to create a permanent system of classified Wilderness Areas that would end the tiring battles once and for all.

Thus it was that in 1956, Senator Hubert Humphrey introduced the first Wilderness Bill in the U.S. Congress. Nine years later, after 64 versions of the Bill had been debated, 18 hearings held, and 6,000 pages of testimony taken, the Bill became law in 1964. With its passage, over 9 million acres of National Forest lands became instant Wilderness, to be "preserved and protected in their natural condition." Some wildlands now had the protection of a uniquely American Law. Wilderness had come a long way from the early concepts of darkness and mystery to a treasured collage of serenity and natural function.

But the Wilderness Act did not resolve all the debates over wildlands. The Act directed that all National Forest lands administratively classified as "primitive" should be reviewed within 10 years and recommendations made to the President of the United States on which of them should be submitted to Congress for Wilderness classification. The Secretary of the Interior was also to review every roadless

area over 5,000 acres within units of the National Park System and recommend their suitability for Wilderness designation by the Congress.

As the 10 years for the Secretary of Agriculture to complete the review of National Forest Primitive Areas drawing to a close, there arose a public call for a review of all National Forest lands in tracts larger than 5,000 acres to determine their suitability for Wilderness designation. Termed the Roadless Area Review and Evaluation (RARE) process, all areas were rated using the Wilderness Attribute Rating (WAR) scale, which identified attributes such as natural integrity, remoteness, and manageable boundaries. Not satisfied with the outcome of that process, wildland advocates called for a second review, termed RARE II. Obviously, the proponents of wild places were growing in number and influence, as was the resolve of their opponents.

## The Future of the West to be Decided

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One by one, individual States began to take an active role in resolving wildland classification issues in the National Forests within their borders. Statewide Wilderness Bills were submitted by legislators, and new Wildernesses were established by Congress in the 1970's and 1980's. Montana and Idaho, however, have not yet been able to reach agreement on which of the remaining 8 million acres of roadless National Forest lands should be so classified. With an increase in Wilderness classification activity in the National Parks, wildlife refuges, and other public lands, the Nation's Wilderness Preservation System now totals 104 million acres. Some observers have suggested that this Wilderness system is now beyond the wildest dreams of the early advocates of wild places, but it is likely that more lands will be added before the System is complete.

The Northern Region of the U.S. Forest Service contains 25 million acres in Idaho, Montana, North Dakota, and northwestern South Dakota. Five million of these acres are designated Wilderness (20 percent of the entire area of National Forests and National Grasslands in the region), and 8 million more are still roadless (another 32 percent in wildland character for a grand total of 52 percent of the region) (fig. 1). These wildlands form a majestic estate and largely shape the character of the Northern Rockies. Their beauty is breathtaking, from wide plains and grasslands to deep mountain valleys and river systems topped by towering peaks. They are home to world-class wildlife populations—grizzly bears, wolves, moose, elk, deer, mountain sheep, mountain goats, wild fish, and hundreds of other native species—that find sanctuary in remote corners, some accessible to only a few visitors annually. These wildlands are also the headwaters of two of the Nation's most significant river systems, the Columbia and the Missouri, both still largely intact in ecologic structure and function on the National Forests and National Grasslands.

As places sought out for primitive recreation, times of solitude, and challenge, the wildlands of the Northern Rockies provide experiences that last a lifetime. Within Montana and Idaho, 1,100 licensed outfitters and 4,000 guides provide services to guests from around the world who desire to see the West they've dreamed about since childhood. These activities generate substantial economic return as

well as maintain a valued way of life in the West: 730 of the outfitters work on National Forests, returning \$600,000 in fees to the U.S. Treasury for the privilege of operating on public lands. Outfitting has a direct payroll of over \$30 million while contributing over \$200 million to the economies of Idaho and Montana. This contribution is one-eighth of the total tourism expenditure per year, according to studies done by the University of Montana and the University of Idaho. Resorts, guest ranches, campgrounds, marinas, motels, restaurants, and the communities surrounding the wildlands of the Northern Rockies directly benefit from these visitors willing to spend millions seeking simply to rest their eyes on a wildland landscape.

But these values of wildlands are still not fully recognized by the citizenry at large. Perhaps no other issue tests the common knowledge of the western economy than the bumper sticker that says "Wilderness—Land of No Use." It is emblematic of the historic utilitarian view that many in the American West still hold, that resources only have economic value when developed or used. If it is not used, it is assumed to be no good to society or its value is assumed to be somewhere in the future when it can be used. Under this logic, minerals must be dug up to produce copper wire or gold jewelry, rangelands must be grazed to produce beef or mutton, timber must be cut to build homes and feed computer printers, or oil and gas must be stockpiled for future supplies.

People have tended to value only those land uses measured in economic terms. Even wild elk and wild fish can be measured in "use values" in terms of expenditures by hunters and anglers, which are rather significant in the Northern Rockies (table 1). But what is the economic value of something that is not used? What is a grizzly bear worth? More difficult yet, what is the value of Wilderness or of the habitat of the grizzly bear?

## An Economic Basis for Decisions

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But views of the value of wildlands is expanding. The wildland backdrop to towns that were once dependent on resource development has now become a magnet for migration. Witness what has happened over and over to villages that began as mining prospects, lumber towns, railroad crossings, cattle shipping stations, forts, or river ports. When the original cause for settlement gave out, played out, or the economics changed, the wildland character remained. Migrants seeking relief from crowded places, affluent citizens seeking to live amidst beauty or wildness, and entrepreneurs speculating on future growth are rediscovering these places for a new set of values. Even long-time residents, seemingly relegated to a ghost-town destiny, have shaken themselves, developed a new theme for their community, and breathed life back into it. But without the wildlands beyond the towns' boundaries, there would have been a void that could not have been filled with foreground attractions alone.

Such is the story of well-known American towns: Aspen, Vail, and Telluride in Colorado; Moab in Utah; Leavenworth and Winthrop in Washington; Wallace in Idaho; and many towns in Montana—all are rapidly growing communities

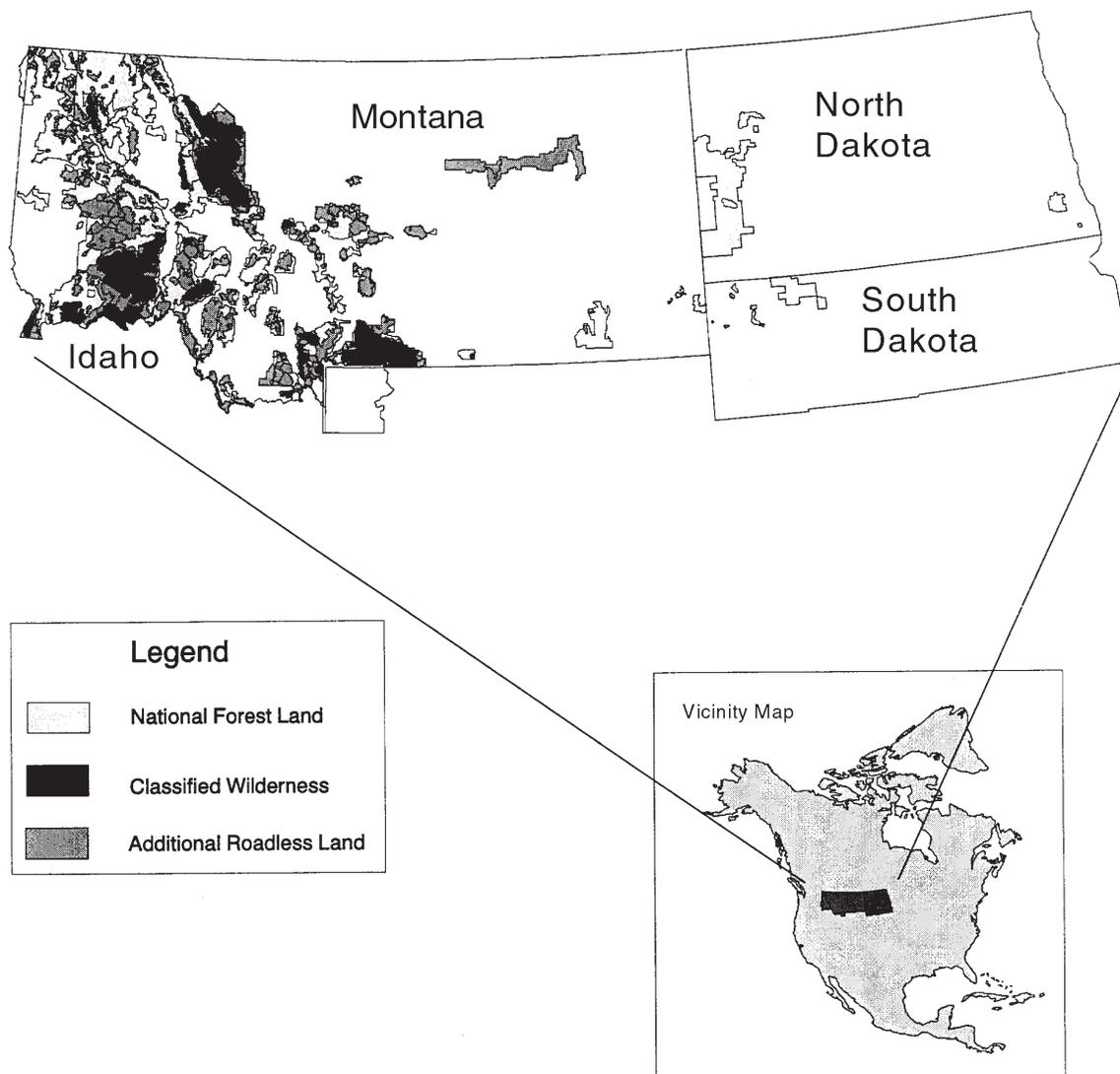
surrounded by wildlands. It is for the wildlands that most of these new migrants come (Power 1991). Once experienced, the hooks of the wildlands are swallowed deep. Populations of western Montana counties have soared over the last 10 years, and new residents who build their homes with a wildland view are willing to pay dearly for the privilege. The fastest growing counties are those containing the largest percentage of National Forest wildlands (Rudzitis and Johansen 1989a,b).

Although some wildland-associated communities remain heavily dependent on resource industries, it is doubtful that future emphasis on commodity extraction will be as heavy as it was in the past. Unfortunately, an immediate tendency is to assume that the next thing to do is expand the recreation and tourism roles of public lands to replace their historic commodity roles. However, a complete transition

from resource extraction to tourism, while in part reflecting a diversification of values, misses what has really happened in the West.

Communities that possess a favorable business climate are those that are able to protect or build their cultural, social and environmental qualities to make the community a pleasant place to live and do business (Rasker 1994). In many instances, the most economically productive and sustainable role of public wildlands is not in resource extraction or tourism emphasis alone, but rather in protecting the wild landscape, the wildlife, the wild rivers and streams, the wild experiences, and the wild scenery while sustaining compatible levels of diverse human uses and developments—all those things that collectively enhance the social, environmental, and economic quality of life for local residents.

### The Northern Region (Region-1) of the USDA Forest Service



**Figure 1**—National Forest lands within the Northern Region of the United States Department of Agriculture, Forest Service. Also shows Wilderness Areas designated by Congress and remaining unroaded lands in the Region.

**Table 1**—Expenditures for hunting, fishing and nonconsumptive uses of wildlife in the Northern Rocky Mountains, U.S.A. (These values are 10 years old and probably conservative for present values.)

<b>Expenditures for nonconsumptive wildlife recreation (viewing), 1985</b>	
Montana	\$43,992,000
Idaho	\$43,212,000
North Dakota	\$16,384,000
Total	\$103,588,000
Source: 1985 USFWS National Survey	
<b>Expenditures for sport fishing, 1988</b>	
Montana	\$193,609,766
Idaho	\$169,853,733
North Dakota	\$97,525,479
Total	\$460,988,978
Source: 1988 Sport Fishing Institute	
<b>Expenditures for hunting, 1985</b>	
Montana	\$45,082,000
Idaho	\$68,168,000
North Dakota	\$25,658,000
Total	\$138,908,000
Source: 1985 USFWS National Survey	

A recent survey of the Yellowstone region (Johnson and Rasker 1995) revealed that traditional reasons for locating business, such as availability of raw materials, the local tax structure, and availability of labor and capital, all ranked comparatively low in peoples' decisions to move to (or stay in) the area. In fact, 66 percent felt they "would be more profitable in an urban setting," but when asked, "all things considered, would you choose to locate a business here again," 86 percent said yes. The most important reasons cited were, in order, "quality environment," "a good place to raise a family," and "scenic beauty." When the responses of "old-timers" were compared to "newcomers," it was revealed that existing business owners felt even stronger about the importance of quality of life variables than recent newcomers. The implication is that the social, cultural, and environmental amenities of a community are even more important to business retention than they are for attracting new businesses. The study concluded that an important role for public policy is to understand the effect amenities have on business owners, and if amenities are a significant determinant of peoples' decisions to stay in the community, then the role of the government should be to protect, and even enhance, the attributes the community finds attractive.

In a similar study, the Sierra Business Council of Truckee, California, released its report on community development and land-use planning in the Sierra Nevada (Sierra Business Council 1997). An interesting aspect of the report is the business community's statements that: (1) long-term economic health of the Sierra Nevada is closely tied to environmental health and (2) current plans do not provide sufficient certainty about long-term environmental health. The report notes that service, technology, and light manufacturing businesses will grow and flourish in the Sierra

Nevada only if the quality of life, expressed to a large degree by environmental health and historic resources, is protected.

Of 15 specific findings and actions identified for each, two are noteworthy: (1) most counties in the Sierra Nevada are taking insufficient steps to safeguard their most critical economic assets—the beauty and rural character of the Sierra's natural environment and (2) rural sprawl is beginning to compromise the economic productivity and functioning of natural systems in the Sierra. If not addressed, the problems will undermine the future of natural resource industries, tourism, and the health of natural systems that sustain all life in the Sierra.

In preparing the report, the authors randomly surveyed 1,000 voters in the Sierra Nevada. Eighty-two percent felt that there is a need to protect wildlife habitat and ecosystems to maintain the health of the natural environment for people. Seventy-six percent believe that maintaining environmental health and the quality of life is one of the most significant things that can be done to attract new businesses to the Sierra Nevada. This completes the vice versa point from our title: economic and community well-being are important to protecting wildlands, which are important to economic and community well-being.

So, what are some of the specific attributes of wildlands that attract people? From the recreation perspective, it is the diversity of available opportunities, from primitive to rural settings. Wildlands offer the hardy the challenge to enter places that offer opportunities for solitude in often spectacular scenery. Non-Wilderness backcountry is available in places for motorized travel in both summer and winter. Hunting, fishing, berry picking, wildlife observation, cross-country skiing, and photography are important to many. Snowmobiling has become "white gold" to several Northern Rockies communities, generating millions of dollars during winter months.

Studies by Rudzitis and Johanson (1989a,b) illustrate how not using resources can play a considerable economic role. They found that counties adjacent to federally designated Wilderness areas grew, on average, twice as fast as metropolitan areas. In order to test the importance of amenities in people's decision to migrate to areas with high environmental quality, Rudzitis and Johanson conducted a random survey of over 11,000 migrants and residents in 15 Wilderness counties in the West. They found that economic considerations were important location variables for only 23 percent of migrants, while 85 percent of established residents felt that it was important to "keep the environment in its natural state." The authors concluded that "amenities and quality-of-life factors are increasingly important to peoples' decisions about moving," and that "newcomers appear to want more access for recreational use of Wilderness, preservation of established Wilderness, and designation of additional Wilderness in the same area." Almost 75 percent of migrants surveyed felt that life was less stressful since they had moved; 91 percent found it more enjoyable; and 89 percent felt happier and healthier since their move.

Citizens of these communities are more willing today to contribute resources to maintain wildland status for lands they value. In Missoula, Montana, the community recently raised \$3 million to acquire land known as Mt. Jumbo to preserve the scenic backdrop to the east of the city. The

area is also an important winter range for deer and elk, which are visible from many points in the city. Most residents also agreed to restrict their access to walk and recreate on the land during critical winter and spring seasons to avoid undue stress on the animals.

Another example is the proposed federal purchase of privately held mineral development rights in the New World Mining District, which is located in the Gallatin National Forest, north of Yellowstone National Park. Rather than permit the development of a gold mine that would have diminished the wildland character of the region, President Clinton authorized \$65 million to purchase the mineral interest—a proxy value of the wildlands that could have been affected by mining. Similar courses of action have been followed in many places when owners of private inholdings within designated Wilderness have sought access. Public pressure has resulted in land exchange or purchase in order to preserve the Wilderness or wildland character.

Another desired characteristic of wildlands is the retention of natural diversity in the biotic community. A landscape unaffected by exotic invaders (weeds and pest species), with native botanical and zoological species present, is most likely to retain its natural ecological functions. Agencies, landowners, and individuals actively work in concert to protect or restore such habitats. In the long run, there is full expectation that economic value will follow.

## Future Wildland Stewardship \_\_\_\_\_

Equally important in making wildlands available to people's use is the management commitment to sustain the characteristics that give wildlands their vitality. If the degree of wildness that defines their character is lost, their value and appeal are diminished. Roadless lands, for example, that await some ultimate legislative designation, remain in limbo for long periods of time. During such periods, these lands are under considerable contention and pressure for development and commodity production. This tension erodes a community's will to jointly resolve issues. With development, short-term economic gains might be possible, but they could also lead to potential long-term losses. On the other hand, it is arguable that some commodity outputs are possible from non-Wilderness lands if done with wise interdisciplinary counsel, followed by restoration of natural processes.

Decisions to keep lands wild require foresight and courage. Such decisions frequently go against the grain of "progress." They appear to promote commonly heard expressions such as "land of no use," "reserved for only the few," and "wasted resources." But today we look back at the early champions of wildness and salute what they accomplished by their dedication and tenacity. We look at the communities that have not sacrificed much of their environmental capital for economic capacity and find them best positioned for success in a changing world. Both the economic and environmental benefits of those decisions to protect wildness and diversity based on its enduring values grow more significant with each passing decade. Both are almost beyond quantification since they include the highly subjective values people hold dear. How indeed can society measure the "soul" of a place?

Wildland concepts require illumination to people. The value of land developed is immediate and obvious; the value of lands left wild and undeveloped is harder to see, but no less real. In order for people to continue to value wildlands, a broad-based educational effort is imperative. Such programs range from utilization of national media to the involvement of local interest groups with wildlands at their back door. Even those inner city residents from major metropolitan centers who may never set foot in a Wilderness can be captured by the knowledge of their existence. Those who are privileged to visit wild places must do so with knowledge of their own effects, ever seeking to use them wisely. To damage them may result in the loss of both their environmental and economic value.

Perhaps the most difficult conditions for sustaining the preservation or conservation of wildlands exist when many of the local or regional citizens are struggling to fulfill the most basic personal needs. Can people see the future value of a higher order need, such as recreational enjoyment, when they are hungry, poorly housed, poorly educated, in ill health, or with sagging spirits? One of the authors once heard a forester in India explain after a passionate speech on the value of a conservation ethic, "Don't you see? Here, conservation comes after breakfast!" One must empathize with such a statement. In theory and in practice, those who benefit from wildland designations on a broad scale should help bear the costs. There is a role for governments at several levels, recognizing that amenity values and quality of life will last over the long run if not truncated for the immediate necessity of feeding its citizens.

In 1907, Gifford Pinchot, first Chief of the U.S. Forest Service, proclaimed, "National Forests exist today because the people want them. To make them accomplish the most good, the people themselves must make clear how they want them run." Wilderness and wildlands exist because an informed electorate pursues and values them. They will only remain as significant contributors to a way of life as long as people find them worthwhile. It is becoming clearer that the economic value of wildlands provides a strong companion to the long valued environmental justification.

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# V. Wilderness for Personal Growth





# Wilderness Experience Programs in the United States: Dependence on and Use of Wilderness

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Josh Carpenter

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**Abstract**—Wilderness Experience Programs can be classified into three general types based on their primary aim: personal growth, education, and healing. These types represent three points on a continuum and provide a framework to better understand the program delivery methods used, dependence on wilderness to function as a Wilderness Experience Program, and the problems the Programs experience operating in wilderness. Wilderness Experience Programs are more dependent on the presence of wilderness characteristics than they are on legally designated wilderness. A survey of Wilderness Experience Programs indicated that approximately one-half of trip or program time is actually spent in wilderness, and the most often reported problems were encountering heavily impacted campsites and trails, agency use regulations, and conflicts with other wilderness uses and users.

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Wilderness Experience Programs have developed rapidly over the last two decades with interest in wilderness as both the setting for experiences and as part of the experience itself. A Wilderness Experience Program (WEP) can include educational, personal growth, therapeutic, healing, or leadership development goals. Growth in the number of these programs available nationwide, in the United States, as well as the number of participants involved is projected to continue into the near future (Easely and others 1990; Friese 1996; Hendee 1994; Hendee and Brown 1988; Hendee and Martin 1994; Krumpe 1990). Some of the more well known programs include Outward Bound and the National Outdoor Leadership School. Wilderness Experience Program providers include commercial operations, college programs, youth groups, religious organizations, and special interest groups. A defining characteristic of WEPs is the centrality of wilderness to the program experience or delivery.

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Wilderness Experience Programs use State and Federal wilderness, as well as other primitive areas, for outdoor adventure, education, therapy, and to achieve other goals. The recreation-type activities range from hiking, backpacking, canoeing, and camping to higher risk activities such as rock climbing, whitewater rafting, and solo travel across a wilderness area. Activities vary widely depending on program goals and may include leadership activities, group therapy techniques, or fasting and vision-questing. Some WEP activities are done in groups and some individually. The implications of these programs operating in wilderness include resource impacts (for example, large group campsites occupied for extended periods cause more vegetation and soil impacts than small groups traveling through a wilderness), interactions with other users (for example, competing for limited or preferred campsites), and wilderness management considerations (for example, requirements for group or outfitter permits, risk and safety issues). Concern by wilderness managers for Program impacts and how to manage them has been documented (Gager 1996; Krumpe 1990), but general descriptive information about Wilderness Experience Programs is limited.

The purpose of this study was to classify these programs and characterize their program methods, program goals, dependence on wilderness to function as an Experience Program, and the problems they experienced operating as a WEP in wilderness. Such a classification serves to inform wilderness managers about WEPs and identify how their needs and goals differ in wilderness.

## Methods

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A nationwide list of 699 potential Wilderness Experience Programs in the United States was generated by Friese (1996) in an earlier study to develop a program classification scheme based on the main aim or goal of the Program, methods used to achieve those aims, and to characterize WEPs. That study achieved a 69 percent response to a mail survey and did not include college and youth programs (for example, Boy Scouts) that are not mainly oriented toward wilderness experiences, nor commercial outfitters and guides. The sample of 330 WEPs used in the mail survey for this study was based on the respondents to the previous study who met the criteria as true Wilderness Experience Programs, using criteria developed by Friese. Results of the earlier study by Friese and colleagues are

reported in Friese (1996), Friese and others (1998a), and Friese and others (1998b). The mail survey was designed and implemented using a technique described by Salant and Dillman (1994) and modified to use only one reminder letter.

## Results and Discussion

Of the initial sample of 330 Wilderness Experience Program organizations that were sent a mail questionnaire, 179 were returned (54 percent). The results were analyzed based on the primary aim of the organization as defined by Friese (1996): (1) personal growth—expanded fulfillment of participant capabilities and potential, including empowerment, spiritual renewal, motivation, self-esteem, confidence, teamwork, or social skills; (2) education—acquisition of knowledge, skills, and experiences to change behavior, increase and enhance understanding, enjoyment, and appreciation, or preservation of nature; and (3) healing—participant therapy or recovery from addiction, disability, illness, abuse, or socially unacceptable behavior. Some WEPs were not able to state one primary aim due to their organizational complexity. Only 155 of the returned surveys indicated their organization’s primary aim, and these returns were used in

the analysis. The percentage distribution of the primary aims among organizations were: personal growth (47 percent), education (43 percent), and healing (10 percent).

**Wilderness Experience Programs use a continuum of methods, from wilderness as teacher to wilderness as classroom.** Friese (1996) proposed a typology for WEPs based on three primary aims and nine methods to achieve those aims. The nine methods were later organized into a continuum of three themes: wilderness as a teacher, wilderness as a classroom, and wilderness as both a teacher and classroom. This study attempted to replicate Friese’s original WEP classification by asking the same type of primary aim and method questions of WEP organizations. The results in table 1 indicate that the conclusions of Friese are supported with: (1) the educational-oriented WEPs most often reported using wilderness as a combined teacher and a classroom; (2) personal growth-oriented WEPs most often reported using wilderness as a teacher or wilderness as a classroom; and (3) healing-oriented WEPs most often reported using wilderness as a classroom. Two concerns for this approach were reported by Friese and were verified in this study: (1) many WEPs reported using two or more methods and could not report that just one main method was used (that is, columns in table 1 total more than 100 percent); and

**Table 1**—Themes and methods by which organizations deliver Wilderness Experience Programs (WEP) by primary aim of the organization.

Themes and methods to achieve primary aim	Primary aim of WEP		
	Education	Personal growth	Healing
	----- Percent -----		
<b>Wilderness as teacher</b>			
Mountains speak for themselves—participants experience the wilderness and participate in outdoor recreation activities. <sup>a</sup>	20	7	0
Reflection—help participants to realize or affirm goals, talents, and values, and see discrepancies between different life roles.	9	19	0
Rite of passage and initiation—facilitates and celebrates participant’s transition from one life phase to another. <sup>a</sup>	3	35	6
<b>Wilderness as teacher and classroom</b>			
Environmental education—help participants understand the natural world and their relationship or connection to it through observation and interpretation. <sup>a</sup>	46	13	0
Expedition learning—participants share responsibility and learn by organizing, planning, and participating in a wilderness expedition.	19	14	0
Field classroom—uses a field setting to facilitate learning of ecology and biology through lecture, discussion, and research. <sup>a</sup>	15	3	0
<b>Wilderness as a classroom</b>			
Challenge and adventure activities—activities used to build skills, self esteem, group problem-solving, and leadership.	20	33	31
Conscious use of metaphor—the wilderness experience is used as a metaphor for events and challenges in participant’s life.	6	14	6
Counseling—instructors provide feedback and structure to help participants be accountable and responsible for inappropriate personal and group behavior. <sup>a</sup>	2	15	63

<sup>a</sup>Significant difference between the three organizational groups: Chi-square > 7.9, 2 df, p < 0.05.

**Table 2**—Goals for participants in Wilderness Experience Programs (WEP) by primary aim of the organization.

Goal types and goals for participants	Primary aim of WEP		
	Education	Personal growth	Healing
----- Percent -----			
<b>Wilderness-related goals</b>			
Increase responsible wilderness behavior <sup>a</sup>	97	75	44
Transfer wilderness experience learning to life <sup>a</sup>	88	93	63
Develop outdoor skills <sup>a</sup>	82	70	38
Promote advocacy and action for wilderness <sup>a</sup>	58	30	6
<b>Personal development goals</b>			
Increase confidence <sup>a</sup>	70	86	94
Learn to work with others	67	71	88
Develop group problem-solving skills	66	59	75
Assume responsibility for self and choices <sup>a</sup>	66	89	88
Enhance decisionmaking skills	64	69	81
Enhance communication skills	58	63	75
Enhance goal-setting abilities	45	52	75
Increase spirituality <sup>a</sup>	30	62	31
<b>Health-related goals</b>			
Therapeutic assessment of client needs <sup>a</sup>	3	21	94
Participant rehabilitation or recovery <sup>a</sup>	8	15	69 <sup>a</sup>

<sup>a</sup>Significant difference between the three organizational groups: Chi-square > 7.8, 2 df, p < 0.05.

(2) specific classification is difficult for a significant percentage of WEPs due to multiple aims and methods. For example, only five of the nine methods had statistically significant differences when comparing which WEP types were using each method. Thus, the WEP classification is better described as a continuum of methods and has the greatest utility as a means to characterize and understand WEP use of wilderness.

**Wilderness Experience Programs are multidimensional in their programing for participants.** WEPs were asked to indicate which of 14 goals for participants were used to achieve the primary aim of their organization (table 2), and multiple goals were often indicated by respondents. These results also support the idea of forming an overlapping continuum because a majority of WEPs from all three primary aim categories reported that six to eight personal development goals were part of their programs for participants. Similarly, three to four of the wilderness-related goals were reported by a majority of education and personal growth WEPs as part of their programs, and over one-third of healing WEPs reported three of the goals as part of their programs for participants. Finally, the two health-related goals were reported by a majority of healing WEPs. Even though nine of the 14 methods had statistically significant differences when comparing which Programs planned for each goal across the three primary aims, there was wide distribution of goal utilization by the WEPs within each primary aim WEP. Like the method types reported in table 1, the goals for participants represent a continuum with no primary aim Program working exclusively within one goal type. These results suggest the multidimensionality of these Programs, which are providing complex programming for a wide variety of participants in a wilderness setting.

**Wilderness Experience Programs see themselves as dependent on wilderness for their program delivery.**

The very definition of WEPs indicates the strong relationship with wilderness and the seeming dependence on the wilderness resource for program existence and delivery. A more direct measure of dependence on wilderness was reported by these Programs in their self-rating of their program dependence on wilderness characteristics to deliver their program successfully. The majority of all three types of WEPs (75 to 92 percent) reported that the wilderness resource was necessary for program delivery by rating their Program as somewhat to highly dependent on wilderness characteristics (table 3). Only a minority of WEPs reported that their Program was somewhat dependent on wilderness characteristics, and none reported not at all dependent. No statistically significant differences were found between the three WEP types and the levels of dependence on wilderness characteristics.

The majority of educational WEPs reported that they spent 50 percent or less of their total trip or program time in wilderness areas (table 4). The majority of healing WEPs reported that they spent 50 percent or less of their total trip or program time in wilderness areas, but a notable number (31 percent) reported spending 76 to 100 percent of their total trip or program time in wilderness areas. The majority of personal growth WEPs reported that they spent 31 percent or more of their total trip or program time in wilderness areas. The reported percentage of wilderness use range was very wide and reflected the diversity of programs offered and variety of means for program delivery. For example, some educational programs spend considerable time in a classroom setting to prepare for the wilderness experience, while some experiential programs for personal

**Table 3**—Wilderness Experience Program (WEP) perceived dependence on wilderness characteristics by primary aim of the organization.

Dependence on wilderness characteristics <sup>a</sup>	Primary aim of WEP		
	Education	Personal growth	Healing
	----- Percent -----		
Highly dependent	61	76	50
Moderately dependent	24	16	25
Somewhat dependent	15	8	25
Not at all dependent	0	0	0
Total	100	100	100

<sup>a</sup>No significant difference between the three organizational groups: Chi-square > 6.3, 4 df, p > 0.05.

growth focus on immersion in the wilderness activities. Statistically significant differences were found between the three WEP types and five levels of reported percentage of use in a wilderness area.

A second measure of dependence on wilderness was reported by the Programs in their rating of program dependence on Federal wilderness areas for successful program delivery. A majority of all three types of WEPs (50 to 57 percent) reported that Federally designated wilderness areas were necessary for program delivery by rating their WEP as somewhat to highly dependent on Federal wilderness (table 5). A minority of WEPs (17 to 25 percent) reported that their Program was not dependent at all on Federal wilderness. No statistically significant differences were found between the three WEP types and four levels of dependence on wilderness characteristics. It seems that dependence on Federal wilderness is related to the geographic proximity to Federal wilderness areas. Some Programs use State wilderness areas where Federal lands are not available or are not close to the program or its users.

**Wilderness Experience Programs perceived regulations and heavily impacted campsites and trails as their greatest potential problems.** A variety of perceived problems in using wilderness areas were reportedly encountered by WEPs in both program planning and delivery. Wilderness Experience Programs were asked to rate their level of difficulty with 19 different potential problems, using five response categories: not a problem, somewhat a problem, a moderate problem, quite a problem, and an

extreme problem. The rating of these 19 potential problems was very similar for all three primary aim WEP categories, with only two problems having statistically significant differences but not at a level that would require differences in wilderness management. Only one problem was listed by a majority of Programs (50 to 64 percent) as a moderate to extreme problem, and that related to heavily impacted campsites and trails in wilderness areas. Since the ratings were so widely spread across the five response categories, the analysis in table 6 is based on the average response with numerical ratings from one through five.

The only potential problem that had an average rating near a moderate problem level was heavily impacted campsites and trails in wilderness areas. A related problem, but rated lower, was the perception by some WEPs that there was inadequate maintenance of trails and campsites. Three other potential facility and service problems were not, on average, rated very high as problems.

Seven of eight potential problems in the regulatory environment were rated, on average, as somewhat to moderate problems for WEPs. The four perceived problems rated highest were: (1) obtaining special use permits, (2) advanced registration, (3) group size restrictions, and (4) general agency use regulations. Since these regulations were generally intended to manage use and to minimize impacts on the wilderness resource, particularly at campsites and along trails, this appears to be contrary to the WEPs concern for perceived impacts of users on the resources at campsites and along trails. Another interpretation of their perception of these regulatory problems suggests that it is also the

**Table 4**—Percentage of total trip or program time spent in wilderness by primary aim of the organization.

Percentage of total trip or Program time <sup>a</sup>	Primary aim of WEP		
	Education	Personal growth	Healing
	----- Percent -----		
0 to 10	26	10	25
11 to 30	27	12	19
31 to 50	15	23	19
51 to 75	16	26	6
76 to 100	16	29	31
Total	100	100	100

<sup>a</sup>Significant difference between the three organizational groups: Chi-square > 16.4, 8 df, p < 0.05.

**Table 5**—Wilderness Experience Program (WEP) perceived dependence on federally designated wilderness by primary aim of the organization.

Perceived dependence on federally designated wilderness <sup>a</sup>	Primary aim of WEP		
	Education	Personal growth	Healing
	----- <i>Percent</i> -----		
Highly dependent	24	27	31
Moderately dependent	30	30	19
Somewhat dependent	29	25	25
Not at all dependent	17	18	25
Total	100	100	100

<sup>a</sup>No significant difference between the three organizational groups: Chi-square > 1.6, 6 df, p > 0.05.

implementation of those regulations that is part of the perceived problem and not the intent of the regulations. For example, obtaining a special use permit may be different for an educational institution group compared to a commercial operation—one may be free while the other is based on gross revenues; however, both may take the same number of people, partake in the same activities, stay in the same location, and have the same impacts on the resource. Two other perceived regulatory problems that were reportedly somewhat of a problem and related to Program delivery costs involved insurance needed to operate a WEP and wilderness user fee systems.

Three other situations perceived as somewhat of a problem were related to the wilderness conditions encountered. The presence of grazing and mining activities in wilderness areas, while permitted in some areas under Federal wilderness legislation, was perceived by respondents as somewhat of a problem to a moderate problem. Two additional perceived problems were rated as somewhat of a problem and were related to other users in the wilderness: lack of opportunity for solitude and conflicts with other wilderness users (table 6). Given the general increase in wilderness use, it is not surprising that WEPs report lack of opportunities for solitude, which implies crowding or widespread use

**Table 6**—Problems for Wilderness Experience Programs (WEP) operating in a wilderness area by primary aim of the Wilderness Experience Program organization.

Problems for Wilderness Experience Programs <sup>a</sup>	Primary aim of WEP		
	Education	Personal growth	Healing
	----- <i>Average rating</i> -----		
<b>Facilities and services</b>			
Heavily impacted campsites and trails	2.8	3.0	2.4
Inadequate maintenance of trails and campsites	1.7	1.5	1.9
Inadequate access and facilities for persons with disabilities	1.5	1.8	1.4
Unavailability of medical services	1.4	1.7	1.7
Lack of improved facilities <sup>b</sup>	1.1	1.0	1.6
<b>Regulatory environment</b>			
Special use permits	2.5	2.3	2.0
Group size restrictions	2.3	1.9	2.3
Agency use regulations	2.2	2.2	1.9
Advanced registration	2.0	1.9	2.0
Insurance needed to operate WEP	1.9	2.2	1.6
User fees	1.9	1.9	1.4
Restricted use areas	1.8	1.7	1.9
Restrictions on moto	1.1	1.3	1.1
<b>Wilderness experience conditions</b>			
Other wilderness uses such as grazing and mining	2.3	2.6	2.0
Lack of opportunities for solitude	2.1	2.3	2.2
Conflicts with other wilderness users	2.1	2.2	2.1
Private inholdings	1.5	1.7	1.4
Danger from wild animals <sup>b</sup>	1.4	1.4	1.6
Harrassment from wild animals	1.3	1.3	1.6

<sup>a</sup>Response categories were: 1 = not a problem, 2 = somewhat a problem, 3 = moderate problem, 4 = quite a problem, and 5 = extreme problem.

<sup>b</sup>Significant difference between the three organizational groups and four categories of response (responses in the quite a problem and extreme problem categories were combined for statistical tests): Chi-square > 21, 6df, p < 0.05.

in wilderness areas. Furthermore, since WEPs use wilderness areas in relatively large groups (often for reasons of economy of scale) and plan specific activities and programs, it is inevitable that they would come into conflict with other users who are using the same campsites, trails, and activity sites.

## Conclusions

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This study has demonstrated what Friese (1996) proposed, that WEPs can be classified into three general types based on primary aim: personal growth, education, and healing. However, it is important to note that these types represent three points on a continuum and provide a framework to better understand the different program delivery methods used by these Programs. These three WEP types and the continuum of aims and program delivery methods they represent are one indication of the multidimensionality of Experience Programs that are providing complex programming for participants in a wilderness setting.

A majority of WEPs perceived themselves as dependent on wilderness characteristics and Federal wilderness areas for program delivery, but there was no difference between the three WEP types in these perceived dependencies. These findings stand in contrast to a study of managers who overwhelmingly perceived WEPs as not being dependent on designated wilderness (Gager 1996; Gager and others 1998). Hendee and others (1990) have recommended that wilderness management should favor wilderness-dependent activities and users over those that can be conducted somewhere else. Since WEPs are more dependent on the presence of wilderness characteristics than they are on Federally provided wilderness areas, some WEPs or some WEP trips or portions of programs may be delivered successfully in an area that has wilderness characteristics but is not designated as a Federal wilderness area. Krumpke (1990) has recommended that WEPs should be encouraged to use nonwilderness areas if they do not depend on wilderness conditions, engage in nonwilderness-dependent activities, or if the Program use causes disproportionate impacts to the wilderness resource or other wilderness user experiences.

Each of the three WEP types reported comparable ratings for perceived problems in using wilderness areas with the most often reported problems listed as heavily impacted campsites and trails, agency use regulations, and conflicts with other wilderness uses and users. Wilderness Experience Programs, like all wilderness users, have an impact on wilderness resources and on other users. The education and personal growth type Programs are attempting to minimize their impacts on wilderness resources and on other users by seeking to achieve three kinds of goals for the participants: (1) to increase responsible wilderness behavior, (2) to develop outdoor skills, and (3) to promote advocacy and action for wilderness. Such goals are not highly rated by healing type Programs, but do not necessarily reflect a lower wilderness ethic.

Wilderness Experience Programs provide many human benefits (for example, healthy bodies and sound minds) to participants and are an important use of wilderness (Easely and others 1990; Hendee 1994; Hendee and Brown 1988; Hendee and Martin 1994; Krumpke 1990), particularly if they support the preservation of our wilderness resources

for present and future generations. All WEPs included in this study are dependent to some degree on using areas with wilderness characteristics. Krumpke (1990) and Gager (1996) have cautioned that wilderness managers need to understand these Experience Programs and their benefits and impacts. Wilderness managers need to better understand WEPs and work with them to foster a better appreciation of wilderness as a resource for a variety of users, appropriate wilderness use and user behavior, and the need for wilderness management.

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# Rites of Passage in the Wilderness: a Therapeutic Source of Cultural and Environmental Recovery

Steven M. Foster

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**Abstract**—Rites of passage in the wilderness have always benefited the individual, enriched culture, and promoted a holistic understanding of the place humans hold within the context of their natural environment. In the modern world, the practice of wilderness rites, such as the “vision fast,” is increasing. With the help of nature, and trained, safety-conscious guides, the individual is conducted through an initiatory passage in which the web of nature plays a vital role in the process of self-discovery. The initiate brings back a story, a myth, a way of visualizing self, from the wilderness ordeal (the threshold). This story, validated by a council of elders, provides the initiate with a “raison” for mature behavior within culture, and in natural environments such as wilderness.

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For untold thousands of years, our indigenous ancestors practiced a primitive form of “psychology” that was nevertheless so effective that it insured the continued survival of our species through times of great upheaval. This psychology focused on rites of passage that guided individuals through personal crises and imbalances that might otherwise have jeopardized tribal welfare and security. Culturally sanctioned, these rites confirmed the passage of the young into adulthood and the mature into ever more mature states of being.

These rites ordinarily took place in wilderness settings outside the village or camp. Everyone paid careful attention, for the rites of passage were the gardens in which the people grew a collective identity. Certain rules were followed and teachings given in connection with these rites, for the health of the community depended on their successful performance. By participating in the rites, whether as initiate, initiatory “midwife,” or elder, the people created and nurtured their own names and lands, and the names and lands of all their earthly relatives, their myths, their legendary leaders and heroes, their sacred ancestors, and the symbols of their unity, health, and destiny. Furthermore, the rites of passage confirmed the vitality of the cultural imagination, enriching the collective body, psyche, mind, and spirit. And the “therapy” practiced by elders and maieutic teachers was far more enriching and complete than what we call therapy today because it took into consideration the health of the individual, the community, and the natural environment.

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We can learn a great deal from these therapeutic practices that were so functional to the survival of primitive cultures, for we are beset on all sides by grave challenges to our survival. The same problems the rites addressed are relevant today, perhaps even more so. Perhaps it is not that we, as human beings have changed, but that the environment we have created to live in has changed. In terms of our “human nature,” we appear to be much the same as our distant grandparents.

The breakdown of the quality of modern life is profoundly connected to the rapidly disappearing wilderness. Unless we provide for our children’s healthy growth into a mature understanding of their place within their earthly home, we will never be able to assure the health of our natural environment and its priceless wild resources.

## Modern Wilderness Rites

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A movement has been gathering momentum throughout the world, especially in Europe and the United States, that seeks to reconstitute, within a contemporary framework, the ancient rites of passage—and to restore a portion of their therapeutic effectiveness within human personality and culture. Wilderness rites, commonly called “vision quest,” “vision fast,” “walkabout,” and other initiatory style experiences in nature, are consciously linked to the old ways and are gaining advocates and influence, but not without difficulty.

At any given moment, in hundreds of wilderness locales, the passage rites built on “old ways” are taking place. The people who choose to experience them come from all walks of life. Usually, they are in the midst of some kind of crisis or life transition and are ideally looking for a way to confirm to themselves and others that they have passed through the difficulty, that they have moved from a state of confusion to a state of resolution or new understanding. They have left an old life behind and are ready to begin a new life, and they have attained the next life station or status.

For over 20 years we have been absorbed in the training of therapists, educators, outdoor leaders, and other professionals in ways of implementing ancient pan-cultural modalities that celebrate life transition, evoke self-discovery, and resolve life crises within a wilderness setting. The dimensions of these modalities are holistic and comprehensive. They affect the whole being. A deeper taproot connects these rites to what the psychoanalyst Carl Jung called the “collective unconscious,” the ancestral memories of our species, graven in our genes. Our School is not alone in offering this kind of training. Many other programs operate with the same intent.

A quick glance at the list of organizations in the American Wilderness Guides Council turns up scores of programs with names like Earth Rites, Wilderness Transitions, Sacred Passages, Back to the Source, Rites of Passage, The Great Round, Earth Passage, Wilderness Rites, High Desert Passages, Animas Vision Quest, and so on. Although each program is distinctly different from the others, a certain methodological similarity binds them together into a common purpose. They all employ the ancient dynamic of initiation, the three phases of a rite of passage identified by classical anthropologist Arnold van Gennep: severance, threshold, and incorporation.

## The Core Dynamic of Wilderness Rites of Passage

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The central idea of a wilderness rite of passage is invariably a story of initiation. The child, the neophyte, the pilgrim, the initiate, severs from the old life, from the way things have been, from a childish perspective, and enters the passageway that conveys the individual to a new status earned by virtue of the trials encountered along the way. This metaphor is very old, at least as old as our human ancestry. It appears in all our mythology, and is the essence of personal transformation, individuation, and growth. Mythically speaking, successful negotiation by the hero or heroine of the threshold passage brings health not only to the individual but to the social order—and by extension, to all creation.

To best understand the meaning of the threshold ordeal, we must always go back to the passageway between childhood and maturity, between innocence and experience. There came a time for all of us when we had to leave the security and innocence of childhood behind and confront a great gulf of unknowing—and we had to encounter that unknowing because there was no other way to attain the knowledge of experience that made for our maturity.

Adolescence is such a passage. It is a particularly perilous passage because our culture does not recognize it specifically as an initiatory passage, and does not celebrate it with sanctioned rites that are meaningful or relevant at the deepest levels to the child's maturing being. Nevertheless, we all attempted to negotiate this passage. Some of us, after many years of groping in the dark, made it to the next stage. Others are still in the dark. Some may stay there until death finally claims them.

That child within us must face an unknown passage many times in life. Adolescence is only one of several significant human transitions. Marriage, divorce, childbirth, parenting, relocation, change of vocation, middle age, and dying all require that the child enter the "adolescent passage" once more. If large numbers of us turn away from this passage that leads to maturity, we will never understand what it means to be fully mature; the human spirit will lack nourishment. Wilderness passage rites address the lack of spiritual nourishment in modern culture.

## The Vision Fast

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At the heart of an initiatory solo fast upon the earth, the initiate is at one with the wilderness. Everywhere lie signs, symbols, teachings, and stories that mirror this person's

feelings, memories, and dreams. The initiate may not be entirely aware of what is happening, and may feel bored, empty, weak, impatient, unobservant. Nevertheless, an interaction is occurring. The memory field is caught like a fly in the web-like memory fields of the wilderness. Information between fields is being exchanged. They "remember" the rocks and trees. And they remember them. They literally "eat" nature. The cacti fill them with sharpness, the flies with irritation, the hard ground with pain, the night with apprehension, the sunrise with joy, the stillness with the pounding of their beating hearts.

Dreams, fantasies, daydreams, and visions arise unbidden, stirring the deep waters of personal myth and answers to the questions: "Who am I?" "Why am I?" "Where am I going?" "Who are my people?" In the lonely solitude, the initiate begins to weave together strands of memories, thoughts, ideas, inspirations, into self-affirmation, an inner feeling about self that is absolutely essential to the life that must be lived, the winters that must be endured, the work of the future that must be done. And all this time the initiate interacts with the sharp edges, the uneven ground, the unshielded heat and cold, the fury of the wind, and the stomach-churning approach of a thunderstorm.

## The Initiatory Passage

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The root of the modern English term "threshold" is the Old English verb, *therscan*, "to thrash," in the primitive sense of "tread" or "trample." The hero or heroine has come to the place where the wheat is threshed from the chaff, the seed trampled from the stalk. The initiate will be held here and lose some of self. What is no longer important will fall away. One of the "boundary conditions" of a safe passage through this zone of magnified power will be the toll paid by the ego. If there is a "problem," the cost will be having to live alone with this problem in the sacred threshing-hold.

Also central to all the anthropological connotations of "threshold"—limit or limitation, border or borderland, margin or shore, cross or crossing, door or doorsill, opening or entrance—is the idea of passage. The hero or heroine passes through this threshold aperture. In a mythical sense, a fetal spirit is negotiating the bardos of the underworld. This intensely physical threshing world has a symbolic dimension, mirrored by everything encountered. By the light of consciousness, images and reflections stand out in the natural mirror. They wait. Gradually they come forth from themselves.

From a purely therapeutic perspective, the threshold phase is full of potentially healing psychological states. Consider the power of boredom to open doors of awareness, the power of weakness to awaken sources of strength, the power of loneliness to evoke those who are truly loved, the power of the uneven ground to teach balance, caution, and a sense of harmony with all things, the power of a storm to ignite existential states, the power of emptiness to induce feelings of fullness, the power of darkness to unlock illumination, the power of light to cast inward shadow.

Shielded from mortal sight and persuasion, the questers can only be who they are, with a matchless opportunity to accept who they are. With the aid of nature, questers resolve into an identity and a place on the earth, naked of pretense

or illusion. In the mirror of nature evolves a name, a dream, a boon, a way to go ahead, an idea, a guidepost, a beacon, a knowing, a vision, another chapter of life's myth. This happens best, of course, with simple guidance from leaders, guides to one's experience in a holistic or mythical way, a way that encourages the initiate to find certain helpful meanings in their experience.

Thus, a wilderness threshold passage takes life, concentrates it into a brief eternal span of literal-allegorical time, composes a story with a real-symbolic meaning whose mortal-immortal protagonist undergoes an ordeal-epiphany in a bounded-limitless environment where ordinary-nonordinary realities exist simultaneously. The story is both the stuff of action (rite) and contemplation (myth). As the protagonists move through the plot of the story, they find themselves in a "double-meaning" universe. An animal is both animal and spirit. A mountain is a mountain and a quest. A star is a star and an angel. A direction walked is a trail and a Way. A dream is a dream and a divine visitation. A mosquito is a pest and a messenger.

## The Mirror of the Elders

The council of elders, to which the quester returns from solitary vigil, is an ancient form of group psychology. It is composed of those who have themselves participated in wilderness rites of passage and are familiar with the monomythic dimensions of the threshold story. The work of the elders is to listen to the quester's story, to reflect their idea of its meaning and wisdom to the candidate, to confirm that the intent has been realized, and to empower the quester to accept and live the truth exemplified by the story.

Questers see themselves in the collective mirror of the elders. The mirror does not judge their behavior or actions any more than nature does. The mirror reflects the quality of the story: the abilities, gifts, character, values, doubts, and life-goals of the "one-who-passed-through-adversity." The mirror reflects that the next life stage has been reached. The adolescent has passed into maturity, and has discovered the self as an unique being, independent of mother, father, or past history.

Modern elders' councils lack the power and relevance of their historical predecessors. In the old days, the elders were mature individuals within the community or neighborhood who themselves had been initiated into maturer and maturer stages of being. They were respected members of the community, for they held the highest responsibility—that of "midwifing" the birth of adults. Theirs was the sanction of an entire community where rites of passage were the means by which the social order maintained itself.

Nowadays, there are few councils of elders among us. No social body exists that formally sanctions and confirms the coming of age of our children, or the attainment of maturer and maturer stages of life by our adults. Therefore, the modern wilderness rite of passage lacks the power of its traditional counterpart. The modern vision fast candidate must return to an uncomprehending world and begin to walk the path of insight with practical feet. They carry with them the fading memory of a vividly experienced event, a renewed sense of their own life story, the validation and empowerment of the council of elders and—invariably—a deep and abiding love and respect for the wilderness. All of

which will hopefully carry them through the difficult tests ahead.

They have lived alone, empty and unshielded, with the wild heart of nature. They have kneeled inside themselves, as Jonah kneeled in the stomach of the whale. They have groped around in their own shadowlands and have met monsters with names like doubt, loneliness, fear, boredom, and rage. They have come forth into the rising sun of a new beginning—and they carry a story—a story of having passed through, a story about a life and a destination. They will forever be grateful to the howling wind, the mosquito, the rattlesnake, the wren, and the dung beetle.

## The Future

This old way must be made available to everyone. It could, in fact, be a key to the initiation of our young into adulthood. Wilderness passage rites must come into existence within our communities as a means of bringing up our children and celebrating our passage through the predictable crises of life. If the movement should fail, we will be deprived of an authentic means of maintaining our place in the interconnected web of nature, and perhaps history!

As we face the 21st century, we must face the fact of the possible demise of our species. The answers to the questions of our collective future may indeed depend on men and women who have returned from the sacred threshold world with the daring to implement their visions. No doubt, the answers for our species are born here, in the family, in the neighborhood, in the schools, in the roots of the culture, and then what is born extends to the wilderness, to the ecosystem, to the biosphere, where the solutions to our cultural predicament wait like golden elixirs to be found and distilled into visions of health for the people. In the words of my former colleague, anthropologist Virginia Hine, "Without rites, the people perish."

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# Buddhism and Deep Ecology: Protection of Spiritual and Cultural Values for Natural Tropical Forests in Asia

Daniel H. Henning

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**Abstract**—Buddhism and Deep Ecology have many similarities, including their ecocentric approach and concern for all living beings. They contribute to the protection of spiritual and cultural values associated with natural tropical forests in Asian Buddhist countries such as Thailand, Cambodia, Laos, and Sri Lanka, and both have a spiritual basis and present a holistic, value-oriented approach for protection of tropical forests. After a preliminary discussion of tropical forests and spirituality, Buddhism, and Deep Ecology, including their integrations and mutual contributions, this paper describes selected spiritual and cultural values within the above framework.

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## Tropical Forests and Spirituality

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Without unforeseen drastic changes in the next decade, protected areas such as national parks and wildlife refuges may well be the only feasible and permanent way of saving some of the remaining Asian tropical forests and their rich biodiversity. However, most of the protected areas in Asia are already under severe depredation due to illegal logging, agricultural encroachments, poaching, and pithing (burning inside of trees). Such destructive practices occur in both Buddhist and non-Buddhist countries in Asia. In Buddhist countries, much of this depredation is associated with villages, even where Buddhist monasteries (or wats, temples, or pagodas) are often nearby. Current efforts, such as through foreign aid, government programs, legislation, non-governmental organizations, science and technology, reforestation, and law enforcement, are simply not working to halt this irreversible destruction and degradation (legal and illegal) of Asian tropical forests and their protected areas. Obviously, something much more is needed, along with new ways of relating to forests, particularly protected forests.

Today there is greater recognition being given to the interrelationships between spiritual beliefs, practices of a

community, and how that community relates to the environment and to the world. As a result, more people are looking at the potential for finding spiritually based solutions to problems that get at the basic causes and values, including ignorance and greed (as noted in Buddhism). These spiritual solutions can include changing values and ways of thinking and behaving from anthropocentric or “people centered” to ecocentered where all living beings are considered to be of value.

## Buddhism

Buddhism presents a perception and awareness of nature through interrelatedness, “Oneness,” loving kindness, and compassion for “all living beings.” Buddhism is often summarized as the extinguishing of suffering. The Dhamma or Dharma (laws and teachings of nature) or nature orientation of Buddhism has numerous values and principles that are correlated with Deep Ecology.

Buddhism is based on impermanence, that everything is changing, that everything is constantly rising and falling away. It also acknowledges that everything that happens (human) depends upon the mind and conditioning. Buddhism focuses on the extinguishing of suffering, which is caused by attachment to anything through ignorance or greed. Buddhism recognizes impermanence in nature, or that everything is changing, or in process of changing, so that nothing is really worthwhile to attach to in the first place (such as illusions). Thus, by detaching, ignorance, greed, and suffering are extinguished.

To stop attachments, Buddhism provides the eight-fold noble path of right understanding: right motives or thoughts, right speech, right action, right means of livelihood, right effort, right mindfulness, and right concentration.

Buddhism is basically Dhamma or Dharma (same) that has two interrelated areas: (1) the teachings of Buddha, and (2) nature that includes everything, including the laws of nature that apply to all life. An example of the teachings is the compassion and loving kindness that were taught by Buddha. Thus Buddhism has a respect for all beings and approaches them with compassion and loving kindness, such as a reverence for all life. The blessings of Buddhists often state, “May all beings be happy,” and, “May all beings be peaceful.”

On the Dhamma or Dharma in nature, it basically means that we (humans) are simply a part of life along with other living beings and that we are included in nature as just another species or living being among other living beings. It also means that there are laws in nature, like impermanence, that operate and apply to nature. Many of these values and laws from Dhamma or Dharma can be correlated with Deep Ecology.

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As a highly respected religion or philosophy in many Asian countries, Buddhism has great potential for influencing people and their thinking, values, and behavior toward tropical forests under Deep Ecology orientations. However, much of this potential has not been developed, nor have many Monks, Nuns, and lay people actually been exposed to Deep Ecology orientations per se. With increasing pressures on tropical forests, many Buddhist leaders are bringing forth more deep ecological orientations on an intuitive basis from their Buddhist backgrounds as well as through training experiences.

## Deep Ecology

Deep Ecology can be considered to include spiritual dimensions of the environmental movement. It asks deeper questions that get at the real causes (such as ignorance and greed) behind issues as well as the “place,” ethical concerns, ecological limits, and so forth. Deep Ecology recognizes *Homo sapiens* as a single species in the integrity of the ecosystem or universe, along with all of the other numerous species of plants and animals, and their interrelationships.

This deep ecological awareness is basically spiritual in nature; it recognizes that other forms of life on earth (and thus their well-being) have intrinsic value and inherent worth regardless of their “usefulness” for people. It further recognizes that human beings are only one particular strand in the web of life and calls for a paradigm shift from anthropocentric to ecocentric. Deep Ecology and its spirituality call for changing the way people think and act to include these new spiritual and value perspectives.

The following statement is “The Deep Ecology Platform” by Arne Naess and George Sessions, two ecophilosophers:

1. The well-being and flourishing of human and nonhuman life on Earth have value in themselves (synonyms: inherent worth, intrinsic value). These values are independent of the usefulness of the nonhuman world for human purposes.
2. Richness and diversity of life forms contribute to the realization of these values and are values in themselves.
3. Humans have no right to reduce this richness and diversity except to satisfy vital needs.
4. Present human interference with the nonhuman world is excessive, and the situation is rapidly worsening.
5. The flourishing of human life and cultures is compatible with a substantial decrease of the human population. The flourishing of nonhuman life requires such a decrease.
6. Policies must therefore be changed. The changes in policies affect basic economic, technological structures. The resulting state of affairs will be deeply different from the present.
7. The ideological change is mainly that of appreciating life quality (dwelling in situations of inherent worth) rather than adhering to an increasingly higher standard of living. There will be profound awareness of the difference between big and small.
8. Those who prescribe to the foregoing points have an obligation directly or indirectly to participate in the attempt to implement the necessary changes (Sessions 1995).

Both Buddhism and Deep Ecology have an ecocentric and spiritual approach. They both define those problems created

through ignorance and greed and solve such problems by moving from an anthropocentric orientation to a spiritually based ecocentric approach. Both Buddhism and Deep Ecology are basically concerned with change. They use values and perspectives that are based on spiritual and holistic principles for positive change in paradigms, attitudes, and practices for tropical forest protection.

Such change is based along clear and realistic lines contained both within Buddhism and Deep Ecology. Both are very similar and can be combined for greater potential in the way that they present a holistic, spiritual, and value-oriented approach to problems such as those presented by tropical forest destruction and degradation. This would include protection of spiritual and cultural values associated with tropical forests and protected areas.

## Natural Tropical Forests and Values

Tropical forests are the richest and most diverse expression of life that has evolved on earth. They are complex and fragile ecosystems with webs of interlocking, interdependent relationships between diverse plant and animal species and their nonliving environment. Tropical forests approximate the primeval forest biomes from which they originally evolved, and contain more than half of the world’s 10 to 20 million or more species of plants and animals. Worldwide, approximately 1.5 million species are presently recorded (Henning 1991).

Irreversibly, tropical forests are literally disappearing within our lifetimes. Most tropical forests are too complex and their species too diverse to regenerate themselves from present destructive patterns or to be managed on a sustained-yield basis. Thus, tropical forest destruction must be considered permanent and irreversible (Henning 1991).

By maintaining intact tropical forests in as close to natural conditions as possible, they can make immensely diverse, productive, valuable, and intangible contributions to all life on Earth on a long-range basis. As noted, present and future protected areas of natural or near natural national parks and wildlife refuges may well be the only feasible and permanent way of saving some of the remaining tropical forests and their rich biodiversity. Many of these protected areas, however, are currently undergoing severe degradation to the extent that their ecological integrity may be in serious jeopardy.

Worldwide, recognition is growing, that in addition to conservation and protection efforts of tropical forest countries, tropical forest destruction is an urgent global problem that requires international action and assistance. In addition, greater awareness of the values of tropical forests is required by the public, by thought leaders, including spiritual leaders, and decisionmakers. It is vital to address not only the destruction but the reasons and values why we should not destroy the oldest, richest, most complex, and productive ecosystems on Planet Earth.

Values are individual and collective concepts with emotional, judgmental, and symbolic components that we use to determine what is important, worthwhile, and desirable. Thus, values contain, and at the same time evolve from, judgements and beliefs about what is “good” or “bad” and “right” or “wrong.” Values, therefore, can significantly influence human behavior regarding the protection or

destruction of tropical forests. Values must also be considered regarding the consequences of both the protection and the destruction of tropical forests (Henning 1992).

By their very nature, values are complex in both interpretation and influence. This is particularly true in regard to tropical forests that involve both anthropocentric (human-centered) and biocentric (ecology-centered) values. The tangible as well as the intangible values of tropical forests are difficult and sometimes impossible to define and formulate, let alone to quantify.

Some of these values may include: biological diversity, genetic diversity, species diversity, agricultural (genetic materials), medicinal, industrial, tropical forest people, maintenance of the web of life, climatic, water conservation, soil protection, outdoor recreation, education, ecotourism, creativity, cultural, spirituality, and future generations (Henning 1991).

There are numerous high-value interrelationships within intact and natural tropical forests that are as yet minimally undisturbed by development, particularly under intangible considerations. In addition to these varied and complex natural interrelationships themselves, some values may manifest as the very ecosystems that are tropical forests per se. This is particularly true of intangible values associated with spiritual and cultural aspects of Buddhism and Deep Ecology.

## Spiritual Values

Human beings are innately spiritual creatures capable of, and drawn to, abstract thought. Spirituality connotes for each of us a diverse, broad, and deep range of relationships that define our underlying sense of identity to ourselves, with others, with life, with the earth, with the universe, and with a higher power.

Although the “higher power” in Buddhism might be considered Dhamma or Dharma (nature), Buddhism, with its philosophy and teachings, provides a definite way of perceiving the spirituality of these relationships, relating directly and indirectly to nature. Deep Ecology often refers to the “Ecological Self,” which is spiritually based on relationships and responsibilities for all living beings and nature rather than the ego. Both of these spiritual approaches to nature and tropical forests are based on “Oneness,” relationships, all living beings, and ecocentric orientations.

The enormous variety of life forms in tropical forests create a powerful spiritual environment, endlessly different and suspenseful as the most mysterious of all natural worlds. This spiritual response obviously has significant impact on virtually all human beings, regardless of their religious, social, and cultural background. This response and impact of tropical forests were experienced and noted by the Buddha.

More than 2,500 years ago, the Gauthama Buddha was born in a forest. As a youth he meditated under Jambo trees, studied among the Banyans, and found enlightenment beneath a great Bodhi tree. A denizen of the woods for the next 45 years, he died beneath a pair of Sal trees among his disciples. Buddhism originated and developed in the company and protection of a great life form: the tropical forest. Thus, Buddhist teachings gave rise to an ecological ethic with a strong concern for nature and the forest. They

emphasize the importance of coexisting with nature rather than conquering it (Kabilsingh 1987).

Silva quotes Gauthama Buddha: “Just as with her own life a mother shields from hurt her own, her only child—let all—embracing thoughts for all that lives be thine” (Silva 1980). Protection of all life is a Buddhist tenant. A Monk’s first vow is, “I abstain from destroying life.” Although sentient beings, or living beings capable of feeling or perceiving conscious, are most often associated with the animal kingdom, some Buddhists include the plant kingdom when referring to sentient beings. Thompkin’s “The Secret Life of Plants” and some plant research certainly suggest that plant life may respond with “feelings.”

Buddhism begins with a reverence for life and its recognition of the interdependence of all life such as “Oneness.” One of the most illustrative influences of Buddhist thought on nature protection is its doctrine of rebirth. This doctrine holds that a human being dying can be reborn as an animal, or an animal upon dying can be reborn as a human being. Hence it would point toward the protection of other living beings under this reincarnation consideration.

The Buddha taught that all sentient beings might attain nirvana, the cessation of suffering and the liberation from the wheel of birth and death. Mahayana, a radical reformation movement in Buddhism around the beginning of the Christian era, opened and stressed the possibility of liberation to greater numbers of beings. In the Gaia view, or the earth as a living organism, the earth itself is considered a sentient being.

With its settings of stunning natural beauty, free from the pressures of civilization, tropical forests provide undisturbed solitude and tranquility where Buddhist Monks, Nuns, and lay people could feel closer to Dhamma or Dharma or nature and to discover many dynamic aspects of spirituality. These experiences, particularly through Buddhist meditation, provide the realization of one’s role or place in the natural scheme of the forests, the planet, and the universe. Besides the monastic lives in forest wats, temples, or pagodas, many Buddhist Monks go on extended walks alone or in groups to fully experience tropical forests and the forests’ rich relationships to Buddhism.

In their solitude and monastic lives in tropical forests, Buddhists are exposed to and educated by the surrounding nature or by Dhamma or Dharma. For example, a Buddhist Monk from Thailand, Phra Prachak, said that he could observe impermanence or change, as well as other laws of nature or Dhamma in the forest, by observing young trees, middle-aged trees, and dying or dead trees. He could also observe Dhamma through young, middle-aged, and dying leaves on a single tree, such as rising and falling away.

With the interacting of tropical forests and Dhamma principles of nature, many Buddhists find they are able to find a sense of “Oneness” with surrounding nature and to recognize their interrelationships and interdependencies with everything that they encounter. Much of this comes by simply living in the forests and meditating so that they lose their sense of separation and gain a sense of “Oneness” and interconnectedness that is transforming on a spiritual as well as a physical and mental basis. It also provides a spiritual philosophy of the environment, or Deep Ecology, which recognizes the sacredness of tropical forests and the humble role of human beings in them as well as the need to reverse the harm that is being done to them.

## Cultural Values

Wherever Buddhism has been influential in a country or culture, there has usually been some direct or indirect benefits for nature and tropical forests. In Buddhist literature, there are 21 tree species under which 25 Buddhas attained enlightenment with veneration and protection of these species as a natural consequence of this belief. In Sri Lanka, Buddhism has had the largest single impact on the protection of flora and fauna, with conservation measures beginning in the third century (Kabilsingh 1990).

John Seed (personal communication) notes, "In Sri Lanka, sacred forest groves have traditionally surrounded temples or shrines. The 'temple forest,' or Aranya, has been referred to in Buddhist texts as far back as 200 A.D. Recent works by colleagues at the NeoSynthesis Research Center (NSRC) in Sri Lanka, have demonstrated that these temple forests are, in many areas, also the last refuge of biodiversity."

However, formal government measures for nature protection require acceptance by the people based on their deep value convictions. Without public acceptance based on deep value convictions, many government protection measures cannot be successful. Studies of national parks in Thailand revealed large amounts of illegal logging and poaching might be stemmed only through an appeal to Buddhist values along Deep Ecology lines. Buddhist forest Monks in Thailand, with their strong concerns for nature and all living beings, are the strongest voices for protection of tropical forests in these areas (Henning 1994).

Buddhist forest monasteries (or wats) are naturally more concerned with forest protection than are monasteries in urban areas. There are approximately 700 Buddhist forest monasteries in Thailand. These monasteries are often located in the last remaining forested lands in their areas where they have a strong and mutual sense of concern and interrelatedness with local populations. Some are located in close proximity to national parks and wildlife refuges. Without the influence of these wats over the past century, there would be little forest remaining in many of these areas, not to mention needed support for the nearby protected areas of tropical forests (Henning 1994).

In the Rukkha Sutta, the Buddha admired those who sat at the foot of trees, who desired seclusion, and who had few needs. These teachings encouraged his disciples to lead a forest life and prevented them from destroying the forest. The Buddhist communities were primarily comprised of forest-dwellers, so these members had to be mindful for protection of the forest, which was basically their abode. Community members had to respect each tree with which they came into contact. The Buddha chose to live in the forest in order to imitate what he saw. He emphasized the value of living in the forest to his disciples and called on newly ordained monks to sit at the foot of a tree (Kabilsingh 1987).

A famous Buddhist story tells how a Monk, while making repairs, cut down a tree that was the abode of a Davida (god). Although the Davida urged him not to cut the tree, "to make an abode for yourself," the Monk went ahead anyway. In so doing, he struck the arm of the Davida's son. When the Buddha learned of this incident, he laid down a rule that forbade community members to destroy any plant growth. The story of the Davida portrays cutting down a tree as a

selfish act. It disturbs the peace of others and deprives the wildlife of their natural habitat. It is also considered an ungrateful act since the monks depend on the trees in their forest dwelling (Kabilsingh 1987).

As the royal ruler of a Buddhist country (Thailand, in Southeast Asia), H. H. King Bhumibol Adulyade, on his sixty-fifth birthday, December 5, 2537 (or 1994), made the following pronouncement on forest protection: "In order to make the forest flourish, it is not necessary to plant one more tree. What is more important is to let the trees that are there grow of themselves and not to interfere with them. Just to protect them and not to harm them is enough."

This royal statement was quoted in a brochure (in Thai and orally translated) by an organization of farmers in Northern Thailand who, in combination with Buddhist Monks, pledged to ordain millions of trees and to create an awareness of forests and their needs for protection. The ceremonies would involve placing orange robes on trees as part of their ordinations so that they could be perceived as "Ordained Monks," a practice that is followed through much of Thailand by Buddhist Monks and communities in efforts to protect tropical forests.

In national parks and wildlife refuges in Thailand, it is not uncommon to see occasional Buddhist Monks who have located themselves in simple camps. These monks, along with those from nearby wats, generally have a good influence for protection over these areas with the nearby villages as well as with government agents. The monks often counsel and advise agents and villagers on spiritual and other matters that might affect the protected areas.

It is also a custom for park staff to practice Buddhist meditation in the early mornings before they proceed with announcements and the business of the day. Somboon Wongpakdee, Superintendent at Lansarng National Park, Tak, Thailand, noted that this practice clears the minds of his staff and encourages them to make greater moral efforts for park protection. Buddhism is also incorporated into training programs for government staff associated with protected areas.

Buddhism provides the foundation of the philosophy and religion for the cultures of Asian countries like Thailand as well as a strong basis for reverence for all forms of life and protection. Buddhist temples (wats, pagodas) can provide environmental education to local populations near protected areas as well as serve as a bridge for public participation with government agencies. Buddhist Monks, Nuns, and lay people can provide leadership and inspiration for bringing spiritually based ecological and biodiversity values of natural tropical forests to the public for their active participation.

In this sense, Buddhism can serve as an environmental educator for tropical forests as well as a spiritual mechanism for influencing the values and behavior of the public, government, and private institutions toward protection measures. It has the potential and ways, particularly with Deep Ecology, to provide spiritual paradigms and solutions to problems and issues that involve moral and value considerations for tropical forest protection or, without them, tropical forest destruction and degradation.

Tropical forests are intimately related to the cultures of tropical peoples through diverse influences on the entire range of knowledge, traditions, and values of the cultures. Asian Buddhism is very much related to the unique interface

between people and tropical forests found in countries like Thailand, Sri Lanka, Cambodia, and Laos. The institution of Buddhist forest wats, temples, or pagodas are especially a part of this unique interface and need the proximity of natural tropical forests. Hence, there is the concern and involvement for protection of natural tropical forests.

Damage to and loss of natural tropical forests also result in loss of significant cultural values and institutions, including lifestyles associated with forests and Buddhism. The impacts of deforestation extend a rippling effect throughout entire cultures, removing and eroding authentic and traditional characteristics, values, and life styles. The natural heritage of native plants and animals, the undisturbed landscape, and the native identity associated with natural tropical forests disappear forever. No reforestation, tree planting, agroforestry, or sustainable forestry projects can replace these natural tropical forests and their values through contributions to a given culture.

Tropical Asian countries and people lose much of their cultural and national identity without their tropical forests. This would certainly include many of the tangible and intangible values associated with Buddhism. The protection of tropical forests through Buddhism and ecological considerations, consequently, also extends to the protection of the unique and traditional Buddhism associated with a given tropical forest Asian country. This would be particularly true for the forest wats or temples. The values of tropical forests, including the cultural considerations, are the very essence of life for all.

## Conclusions: Future Generations

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Concerns and responsibilities for natural tropical forest must extend to future as well as present generations because these threatened ecosystems are highly susceptible to irreversible removal or very serious and damaging reductions, with resulting loss of spiritual, cultural, biodiversity, and other values and options for survival and quality of all life.

Buddhism and Deep Ecology recognize the moral or value obligation and responsibility to protect tropical forests for future generations of all species, plant and animal, known and unknown. They are concerned with the essential

protection of natural tropical forests for their own sake for the future on an ecocentric rather than an anthropocentric basis.

Future generations of all forms of life require that tropical forests be protected in an intact and natural state. Humankind, including the Buddhist communities, need tropical forests for their tangible and intangible values, including those associated with spiritual and cultural values. Tropical forests could survive quite well without human presence and impacts. Yet it is only within intact, natural tropical forest environments that diverse and interdependent forest species can carry on their struggle for survival and evolution.

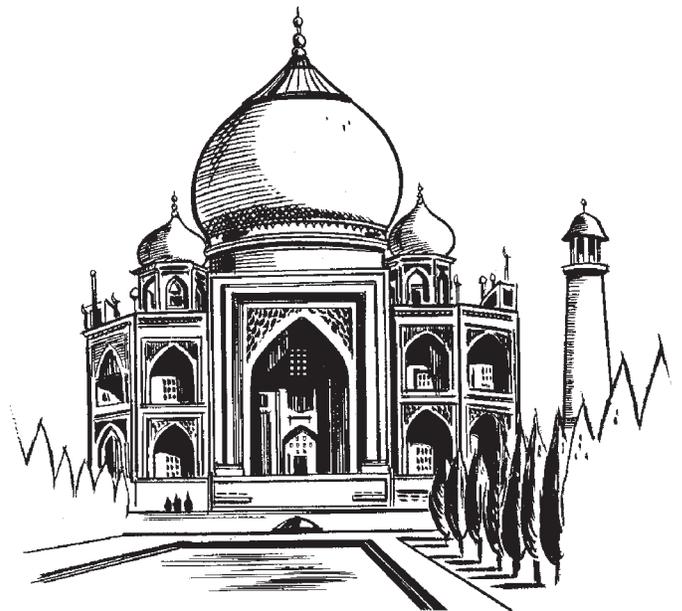
Hence the need to protect the ecological integrity of current national parks and wildlife refuges and to establish and maintain more protected areas of natural tropical forests in Asia. It is essential that present and future generations of all life have natural tropical forests for survival and quality. Buddhism, particularly under some Deep Ecology orientations, has very important roles to play in the protective process for spiritual, cultural, and other values associated with the remaining natural tropical forests and their future in Asia.

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## VI. Understanding Threats and Services Related to Wilderness Resources





# Tourism in Wilderness: M&M Toolkit

Ralf Buckley

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**Abstract**—Recreational use of wilderness is increasing rapidly. Many strategies have been proposed to control visitors and impacts. They can all be viewed as parts of a monitoring and management toolkit. Different tools work better for different tasks. The tools do not define the tasks. Monitoring tells what tasks need to be done, how urgent and serious they are, and when they are completed. It is also needed to test how well each tool works for different tasks.

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Recreational pressure on conservation reserves is continuing to grow. Worldwide, increasing numbers of private individuals and commercial tours are visiting National Parks, World Heritage areas, conservation reserves, public lands, wilderness areas, and fragile environments. This increases both actual and potential environmental impacts, and the management effort and investment required to control impacts and maintain the primary conservation function of the areas concerned (Lindberg and McKercher 1997).

## Management Tools

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Land managers in different jurisdictions have traditionally used different approaches to managing tourism and recreation. Broadly, the main options are either to harden the natural environment against visitor impacts or to influence visitor numbers and behavior so that impacts in different areas are kept within limits (Buckley 1994; Buckley and Pannell 1990; Cole and others 1987; Harroun and Boo 1996).

Hardening typically involves construction of tracks and boardwalks, campsites and fireplaces, and toilet facilities. Visitor management may involve regulations, educational programs, fees, and charges.

Regulations can include constraints on numbers of visitors permitted or forbidden in different areas at different times of the year, the activities they are permitted or forbidden to undertake, and the equipment they are permitted or forbidden to use.

The most widely used regulatory technique is zoning, where different areas are set aside for different activities or sets of activities. Seasonal closures, such as those associated with hunting and fishing licenses and use of open fires, are also common. Limits on visitor numbers, such as setting a fixed total quota for overnight camping with an associated permit allocation system, are widespread in heavily used

National Parks and other wilderness areas in many countries. Other common types of regulation include bans or restrictions on motorized vehicles and watercraft, pack animals and pets, and fires and firearms. Prescriptions of maximum party size provide another example.

Education programs may include interpretive centres, track-side signs, and guided activities. Education and regulation may be linked (for example, educational leaflets or videos followed by a test that must be passed to obtain a permit for access or for a particular activity).

Fees and charges such as entrance fees, overnight camping fees, and commercial permit fees are now levied by many parks and other protected areas, both public and private. Most of these appear to be designed to raise revenue rather than influence visitor behavior. Most charges levied directly on individual visitors are relatively low. Some indirect charges, however, levied through licence and franchise fees paid by commercial tour operators, are substantial.

## Management Frameworks

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Historically, different approaches to managing tourism in conservation reserves have been emphasized at different times, in different conceptual frameworks. Examples include carrying capacity, recreational opportunity spectra, limits of acceptable change, and visitor impact management planning (reviews, Lindberg and McKercher 1997; Lindberg and others 1997).

There is little to be gained from arguing the merits of one approach or another. It seems more useful to recognize that they can all be considered as different aspects of a single all-encompassing strategy, which for convenience I have referred to as monitoring and management, or the M&M Toolkit.

## Toolkit Approach

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The essential aspects of the M&M Toolkit are as follows. First, it's a toolkit. No tool is innately superior to any other; you pick the tool that fits the task. For some tasks, any one of a number of tools could suffice. Other tasks need several tools used together. Sometimes it is obvious which tool will be best; sometimes it takes skill and experience to select the right tools in the right sequence. The size of the tool, as well as the type, must match the size of the task. You don't need a sledgehammer to crack a nut; but you can't kill a wild pig with a popgun.

Second, the toolkit does not define the tasks. The methods available, and their effectiveness and costs, may limit what goals are achievable; but they do not determine how to choose between the achievable goals.

Third, you must be able to tell when a task needs to be done, how urgent it is, and how serious it is. This is not

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always straightforward. If major environmental impacts have already occurred at a particular site, it will generally be obvious that remedial work and rehabilitation will be required, and measures will need to be taken to prevent the impact from recurring. Both these steps are likely to be expensive; and it may still prove impossible to rehabilitate the area fully. If the impact could have been predicted or detected at an earlier stage, and certainly before it reached any threshold of irreversible change, it could have been overcome or avoided much more cheaply and easily. As with any toolkit, preventive maintenance generally needs less effort and smaller tools than major repairs. While some impacts are detectable by the naked eye of the park ranger well before they are likely to affect critical ecosystem functions, others are not and, in fact, can only be detected with relatively sophisticated scientific equipment and statistical analysis. Therefore, the monitoring component in the M&M Toolkit is critically important.

Fourth, in order to use any particular tool one must know what it is for and how well it works in different potential applications. Before it can become part of the routine toolkit, any tool must first have been tested in different situations. Sometimes this leads to the invention of new tools or improvements to old ones. Again, in the context of managing tourists in wilderness areas, this is not always straightforward. Ideally, it requires quantitative measurements of the impacts of different numbers of tourists, engaged in various different activities, on various different environmental parameters, in various different ecosystems, when different visitor management tools are in operation.

Once the toolkit analogy is made, all of the above is self-evident, especially with the benefit of hindsight over several decades of park and wilderness management. It is still a useful conceptual approach, however, for several reasons. First, it emphasizes that many different approaches may each have a place in appropriate circumstances. Second, it emphasizes that the sustainable use of wilderness areas for tourism and recreation requires the management of people within the natural environment. And third, it emphasizes that management needs monitoring: of the state of the environment; changes caused by tourists; and changes to those changes, as a result of management.

Conceptually, many parks and wilderness managers have long since embraced all these philosophies. Monitoring, however, is generally at the eyeball level, so management

action is not taken until impacts are clearly apparent to the naked eye. At this point, there are typically few options available, especially because it is politically much more difficult to reduce visitor numbers or activities than it is to limit them before numbers increase or activities commence. The most common response of park managers is, therefore, to harden the environment against ever-increasing numbers of tourists. This in turn consumes an ever-increasing portion of management budgets, and this in turn forces managers to levy increasing visitor fees to cover the cost of infrastructure (Driml and Common 1995; Eagles 1995).

To break this vicious cycle, managers need to devote more of their budgets to monitoring the state of the environment, and testing the effectiveness of management tools, before impacts become irreversible.

The establishment of monitoring programs, and selection and application of management tools, are choices which can only be made by land managers. Research groups can assist, however, by compiling and analyzing data from past impact measurements, improving the design of monitoring protocols, establishing the relative effectiveness of different environmental parameters as general indicators of ecosystem health or impact, and testing the effectiveness of management tools.

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# Monitoring Recreation Resource Impacts in Two Coastal Areas of Western North America: an Initial Assessment

Christopher A. Monz

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**Abstract**—Assessment and monitoring programs were initiated in two very different coastal ecosystems in Western North America: Baja California, Mexico, and Prince William Sound, Alaska, U.S.A. Each project is an effort to assess the location, condition, and distribution of primitive campsites. By adapting established monitoring protocols to each of these environments, campsites were evaluated on the basis of condition class estimates, size of impacted area, degree of vegetation loss, and extent of soil erosion. In general, campsites at these areas represent a wide range of the impact spectrum, from relatively highly impacted to nearly pristine. In Prince William Sound, the primary campsites at 63 beaches were intensively measured and designated for permanent monitoring. Sites were most commonly located on organic soil (forest understory) or on beach gravel. Vegetation on both of these soil types was very susceptible to use, with the gravel sites (beach grasses) exhibiting a 93 percent median cover loss, and the organic soil (mixed herbs and mosses) yielding an 81 percent loss. Analyses at the Baja campsites revealed similar trends of vegetation loss and emphasized the need to utilize available resistant substrates, such as unvegetated beach gravel, for camping and recreational activities.

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Providing appropriate recreational opportunities for visitors to protected areas can often be a management challenge. Although visitation is one of the primary reasons for creating and managing these areas, human use frequently conflicts with land preservation. Appropriate management strategies must be a careful balance between offering recreational opportunities and protecting resources from human impacts.

Recreational kayaking, sport fishing, and power boating continue to increase in many wildland coastal areas in North America. Two areas where increased use is particularly noticeable are Prince William Sound in southeast Alaska, U.S.A., and the mid-gulf coast region of the Baja California Sur, Mexico. Though these areas differ dramatically geographically and ecologically, many use-related similarities exist. Both have received significant nonrecreational human impact, experienced recent increases in recreational use, and have received little direct recreation management. In addition, our observations would suggest that the majority of the increases in use seem to be the result of increases

in sea kayak camping, with some additional overnight visitation by motor boat and sailing use. Managing recreational resources in these coastal wildlands is particularly difficult because campsites are widely distributed geographically, and since travel is primarily by boat, there are no identifiable trails leading to the sites. These areas are well known worldwide for their pristine and wilderness character, and arguably, the increase in use has been a direct result of visitors seeking this kind of wildland experience.

The assessment and monitoring of campsite conditions has been employed in many areas of the United States as an important component of an overall wildland management strategy (Cole 1983a,b; Frissell 1978; Marion 1991). The loss of vegetation, soil erosion, and associated aesthetic degradation of sites are a significant management concern, particularly when visitation is increasing. Impacted sites not only tend to increase in size with increasing use, but impacted areas can also proliferate as campers move from degraded sites to unused areas. Because an overwhelming proportion of soil and plant impact tends to occur with the first few nights of visitation, this trend can cause a rapid increase in the total amount of impacted area (Hammit and Cole 1987). An initial assessment and subsequent continued site monitoring can provide vital information to determine the extent and type of management actions needed to preserve the wilderness character of an area and to protect the condition of its resources.

The overall objective of this project was to assess the existing camping impact from recreationists in both of these important areas. This project also established a network of campsites for long-term impact monitoring, identified areas of current and potential use, and with future studies, will examine if the extent and degree of impacts change over time. This paper discusses the preliminary findings of the initial assessment work and comments on an adaptation of established monitoring protocols to these coastal ecosystems. Future reevaluation of these sites will examine changes in campsite conditions over time and attempt to relate these trends to changes in the amount, type, and distribution of visitor use.

## Approach

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### Study Areas

Prince William Sound is located roughly at 61° N 148° W and spans an area of approximately 4,000 km<sup>2</sup>. The area is known for the port towns of Valdez, Seward, and Whittier, where the principal economic activities of commercial fishing and crude oil transportation take place. More recently,

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tourism activities have increased, with commercial sightseeing tours and cruise lines operating in the area.

In 1989, the tanker Exxon Valdez ran aground on Bligh Reef and spilled ~41 x 10<sup>6</sup> L of North Slope crude oil. A total of approximately 800 km of shoreline were oiled by the spill (Neff and others 1995). As a consequence of natural processes and cleanup efforts, little observable surface oil remained 2 years after the spill, and by some accounts, the natural system had returned to normal appearance by mid-1991 (Wiens and others 1996). The cleanup efforts had an effect on the beaches from the introduction of many thousands of cleanup workers in areas that had previously received little (if any) human activity, and impacts such as the trampling of beach vegetation were observed.

Despite these disturbances, much of Prince William Sound retains a pristine character. The large geographic area, the convoluted coastline with many passages and bays, and the lack of road access have kept casual entry to a minimum and have permitted backcountry users to disperse. The area attracts many sea kayakers, sport fishers, and powerboat users who are looking for a pristine area experience.

Consequently, the area receives significant primitive camping use, and currently, both pristine and heavily used areas have received little direct management for recreation. It is likely that if proposed road development plans proceed, the area will see significant increases in recreational use. Currently, little is known about the condition or location of campsites along the coast of Prince William Sound. Because these backcountry sites have been chosen by visitors and not direct management action, an assessment of these sites provides valuable data on historical use as well as the current state of resource conditions.

Study sites at Prince William Sound are located along two popular kayak routes that begin in the town of Whittier. Both routes have seen recreational activity for over 25 years and contain sites that see a wide range in use. In general, campsite use levels are roughly proportional to the distance from Whittier.

The second study area is Baja California Sur, Mexico. The central gulf coast of the Baja peninsula (approximately 26° N 111° W) is well known for outstanding coastal resources and a unique desert-coastal ecosystem. The traditional fishing economy of the coastal towns of Loreto and Mulegé, Baja California Sur have recently undergone a transition as ecotourism has grown in the region. The area offers outstanding fishing, primitive camping, wildlife viewing, and kayak touring. These ecotourism opportunities are enhanced by a wild, largely undeveloped, and sparsely populated style of land use. However, in recent years, development is proliferating and changing the nature of this coast. This has been exacerbated by the limited land management possible in the region, and many long-time visitors and residents have observed significant increases in coastal impacts due to camping and recreational use.

The overall goal of the study was to inventory all the camping areas between Coyote Bay in the north and San Cosme, south of the town of Loreto. The study also included the islands of Coronados, Carmen, and Danzante, which have been recently experiencing the most significant increases in visitation, due in part to their proximity to the port town of Loreto.

## Campsite Assessment

Standard campsite assessment protocols, developed and applied by both the USDI National Park Service (Marion 1991) and the USDA Forest Service (Cole 1983a,b) in many protected areas throughout the United States, were used. However, virtually all of these studies have assessed campsites in forested areas. Basics of these studies were used, but methods were modified appropriately to the Prince William Sound and Baja California Sur study areas. Table 1 shows the basic inventory parameters for each camping area, while table 2 is a listing of the impact parameters measured at each site. For a more detailed description of the measurement methodology please see Marion (1991).

For measurement of the campsite areas, the radial transect method was employed (Cole 1982; Marion 1991). Condition class measurements followed standard categories as suggested by Marion (1991) with the exception of the following modifications:

For Prince William Sound campsites, a condition class “0” was adopted for areas where campsites were “suspected” but not confirmed through observations (for example, impacts were barely distinguishable). These seemed to be old sites that had apparently seen little total use, and then vegetation had regrown almost completely. Campsites on beach cobble substrates were rated 0 through 4, with 4 being the highest possible impact, for complete vegetation loss. Impact did not proceed past this point due to the resistance of the substrate, (for example, no soil erosion was present as in forested sites). The estimates for forested sites followed the descriptions in Marion (1991) closely with a 0 through 5 rating scale.

For Baja California Sur campsites, a simple 1 through 3 condition class scale was adopted with descriptions as follows:

1. Minimal impact to the site. Site is barely discernible but is distinguishable as a campsite. Minimal loss (if any) of vegetative ground cover. Frequently identified by flattened, but still viable vegetation.

**Table 1**—Campsite inventory parameters at Prince William Sound and Baja California Sur.

Site number (designated) and name	Site location (GPS coordinates)
Substrate of landing area	Substrate of campsites
Number of campsites at beach	Compass orientation of beach

**Table 2**—Campsite impact assessment parameters at Prince William Sound and Baja California Sur.

Size of impacted area	Condition class
Vegetative ground cover on site	Vegetative cover off site
Mineral soil exposure	Tree damage
Root exposure	Number of tree stumps
Number of trails	Number of fire sites
Litter and trash present	Observable human waste

2. Significant loss (approximately 20 to 50 percent) of vegetative cover. Campsite has an easily discernible perimeter, and possibly some light soil disturbance or displacement.

3. Site highly impacted. High degree of vegetative cover loss (more than 50 percent). Evidence of soil compaction, displacement, or erosion.

This system was advantageous in the arid ecosystems in Baja because the ground cover vegetation density tends to initially be fairly low and soil substrates are generally devoid of a surface organic layer, making additional impact classes difficult to determine.

A Garmin hand-held GPS (model GPS 45, Garmin International, Lenexa, KS 66215 U.S.A.) was used to get latitude and longitude coordinates on all beaches. Photos were taken at each site to document impacts and to help with site relocation.

## Data Analysis

Campsite areas were determined geometrically from the radial transect data by using a computer program developed by Marion. Relative vegetation cover loss was calculated by:

$$RC_L = 1 - \frac{\% \text{ cover in campsite}}{\% \text{ cover in control plots}} \times 100$$

All data were summarized and synthetic variables were calculated using Microsoft Excel (Microsoft Corporation, Bellvue, WA, U.S.A.) and SPSS statistical software (SPSS, Inc., Chicago, IL, U.S.A.).

## Results

### Prince William Sound

Campsites at 63 beaches were assessed in June of 1995 and 1996, which roughly approximates mid growing season. A large range of campsite conditions were found, (condition classes range from 0 to 5), with the median condition class being 4 (table 3). This indicates that sites tend to be moderately to highly impacted. There are also several important beaches where multiple impacted areas are forming, apparently due to multiple parties camping simultaneously. Impacted area of campsites ranged from 9 to 255 m<sup>2</sup> with the median campsite size being 28 m<sup>2</sup>.

As depicted in table 3, a median of 93 percent relative vegetation cover loss was found on campsites, compared to control plots. Although there were a few sites on mixed organic and mineral soil substrates, there were mainly two primary soil types where campsites were found: a coarse beach gravel substrate ("greywacke") dominated by beach grasses, and a highly organic soil in the forest understory dominated by mosses and forbs. The beach grass community showed a trend of less tolerance to use, showing a 94 percent median relative cover loss compared to an 81 percent relative loss in the forest understory (P = 0.081 with Kruskal-Wallis test.)

Damage to trees, observable root exposure, and cut tree stumps were found on approximately half of the sites inventoried (table 4). Multiple trail development to campsites was prevalent, occurring at 73 percent of the sites while fire scars and rings were less of a problem with just a 33 percent frequency. Evidence of improper disposal of human waste was found at only 8 percent of the sites surveyed.

**Table 3**—Summary of campsite conditions in Prince William Sound and Baja California Sur study areas.

Impact parameter	Study area <sup>a</sup>	
	Prince William Sound N = 63	Baja, Mid-Gulf Coast N = 51
	<i>Mean (min-max)</i>	<i>Mean (min-max)</i>
Condition class <sup>b</sup>	4 (0-5)	2 (1-3)
Absolute vegetation cover loss <sup>c</sup>	47% (0-96)	36% (0-96)
Relative vegetation cover loss	93% (0-100)	84% (0-98)
Mineral soil exposure	86% (2.5-98)	n/a
Tree damage rating <sup>d</sup>	2 (1-3)	n/a
Root exposure rating <sup>e</sup>	1 (1-3)	n/a
Number of tree stumps/damaged shrubs	1 (0-12)	0 (0-8)
Number of trails	3 (0-9)	3 (0-8)
Number of fire rings	0 (0-2)	0 (0-15)
Litter/trash rating <sup>f</sup>	2 (0-3)	2 (1-3)
Area of campsites	28.0 m <sup>2</sup> (9-255)	63.0 m <sup>2</sup> (10-375)
Total impacted area per beach	46.3 m <sup>2</sup> (9-512)	66.50 m <sup>2</sup> (11-775)

<sup>a</sup>Condition class assessment scales for the two areas are different (as indicated in the methods section), so direct comparisons between the two study areas for this parameter are not valid.

<sup>b</sup>Follows Marion (1991) except as noted in methods.

<sup>c</sup>Total percentage cover loss; for example, if remaining cover is 50 percent and control plots have 70 percent, this percent loss would be 20 percent.

<sup>d,e</sup>Rating systems were: 1 = little/none; 2 = moderate; 3 = severe.

**Table 4**—Frequency of observation of impact problems at the Prince William Sound and Baja study areas.

Impact parameter	Frequency <sup>a</sup>	
	Prince William Sound	Baja, Mid-Gulf Coast
Moderate tree/shrub damage	52	51
Moderate root exposure	41	n/a
Cut tree stumps/cut shrubs	57	29
Multiple trailing	73	76
Fire sites present	33	33
Significant presence of camping trash	54	59
Observable human waste	8	41
More than one campsite/beach	42	75

<sup>a</sup>Values are the percentage of sites that demonstrate the indicated impact parameter.

## Baja California Sur

Campsites in the Baja study area were measured during March and April of 1996 and 1997. Fifty-one separate camping areas were inventoried and a median condition class of 2 (on the 1 to 3 scale as previously described) was found with an overall relative vegetation loss of 84 percent (table 3). Campsites were found mainly on sandy soils that contain dune grasses, desert annuals and perennial desert shrubs. Campsites tended to be large, with a median size of 63.0 m<sup>2</sup>. Mineral soil exposure, tree damage, and root exposure were not applicable to this ecosystem type. Significant damage to woody shrubs adjacent to campsites was observed on 51 percent of the sites and this was mainly in the form of broken stems (table 4). Cutting of stems was observed in just 33 percent of the sites. We observed multiple trailing, multiple campsites, and a significant amount of trash at many campsites. Improper disposal of human waste was prevalent, occurring at 41 percent of the sites assessed (table 4).

## Discussion

The initial assessment and monitoring of campsite conditions is an important information gathering step in the overall mission of preserving resource conditions while simultaneously allowing for visitation. While monitoring methodologies have been applied and effectively utilized in many natural areas (Cole 1983b; Frissell 1978; Marion and Leung 1997), applying these techniques to nonforested ecosystems requires some procedural modifications. Initial assessment work can often highlight the need for and help define the type of management action, hopefully before significant resource degradation occurs.

These studies are an application of previously developed monitoring methodologies to new ecosystem types. While describing the current condition at individual “problem” sites and quantifying the subsequent progression of impact trends is beyond the scope of this paper, this work is the important preliminary work needed to accomplish this task in the future. The following discusses our findings from this initial assessment and highlights the challenges of monitoring at these individual areas.

## Prince William Sound

Hammit and Cole (1987) describe a general relationship between the amount of use and the loss of vegetation cover. In general, the first few occasions of use tend to result in the majority of disturbance to plant and soil communities. These observations have led to the recommendation of camping in sites that are already highly disturbed, if such sites already exist. Once impact has occurred, little additional impact accrues on these disturbed areas. This principle is illustrated in the Prince William Sound study with the beach grass community that exists on the gravel substrates. Although the vegetation is highly susceptible to initial use (probably due to the ease of stem breakage of the tall grasses), these areas are highly resistant to any further impact because of the gravel substrate with little or no organic soil remaining. This is contrasted with the soil and understory communities in the forested areas, which show a trend of less relative cover loss initially, but may continue to be susceptible to disturbance because of the thick, soft organic horizon and the potentially slow plant regrowth. The soils in the forest understory are easily displaced and disturbed by hiking boots and, therefore, even sites that are normally thought of as being beyond the point of any additional impact are still being affected. At most beaches, camping is possible on both beach gravel and forest understory surfaces, and often very functional campsites can be found on beach gravel within a few meters of the forest interface. An important management implication here is to make every effort to (1) have visitors camp on the gravel surfaces whenever possible, (2) avoid any additional disturbance to the intact beach grass community, and (3) avoid substantial travel and camping in the forest understory, even in areas previously disturbed.

## Baja California Sur

Baja campsites represented a significant assessment challenge, mainly due to the initially sparse vegetation, the sandy soils, and the dispersed nature of the campsites. A good indicator of significant impact to forested campsites is the degree of mineral soil exposure, which is proportional to the amount of displacement of the surface organic horizon

occurring after significant vegetation loss (Marion 1991). Currently, attempts are being made to develop an analogous measure (perhaps soil bulk density) for these sites where no organic layer exists and yet impacts seem to be continuing to the soil after all vegetation is lost.

In general, campsites were large with indeterminate borders. Since the boundaries of the previously impacted area are much less distinct, campers may tend to drift to the borders of these sites or to new areas and, therefore, the potential for increasing the size and number of campsites is high. Vegetation losses on the campsites in this ecosystem are substantial, and it is likely that these plant communities are not resistant or resilient to trampling disturbance.

Human waste and trash from campers are a significant problem in Baja, occurring at 41 percent and 59 percent of the campsites assessed. In popular sites, human feces and toilet paper on the open ground or just under larger rocks was observed, often within 10 m of the campsite. There is also the additional problem of trash washing up on beaches from unknown origins.

Some sections of the coastline do not have easily measured impacts or obvious campsites despite historical observations of camping in these areas. These sections include big sandy beaches with open, sparse vegetation and cobble washes devoid of significant plant cover. This reaffirms that camping and traveling on durable surfaces and other minimum-impact principles can be effective in coastal desert regions.

For both of these important coastal areas, these data suggest that management strategies may be appropriate. Though the overall areas are vast, relatively few beaches are suitable for overnight use, and recreation sites in these areas are experiencing moderate to high levels of impact. Recent studies have contrasted dispersal versus containment strategies in forested ecosystems of the Eastern United States (Marion and Leung 1997; Williams and Marion 1995). These and other results indicate that in general, in areas where use levels tend to be low and resistant soil and plant communities exist, dispersal can be an effective strategy. In areas with higher use and with substrates that are susceptible to impact (such as in these study sites), containment strategies can be a more effective method of avoiding overall increases in the amount of disturbed area. In both Prince William Sound and Baja California Sur, there is an outstanding opportunity to limit future impacts by directing visitors to highly resistant campsites and away from areas where even a small amount of use seems to result in lasting effects. A containment approach to overnight use, whether it be more rigorous education of visitors or actually designating campsites, could be part of a comprehensive management strategy in the future.

As mentioned previously, one of the challenges in assessing these areas was the modification of existing campsite monitoring protocols to nonforested ecosystems. Specifically, the estimation of percent plant cover, the condition class definitions, and the method of estimating the degree of soil disturbance in degraded sites required significant modifications from the original published methodologies (such as in Cole 1983a; Marion 1991). Regardless, the overall original methods are applicable to these ecosystems, and with a few modifications as mentioned here, it is likely that they could be applied to many areas worldwide.

As with many inventory efforts, this project has brought forth additional questions to be examined. Consider, for example:

- What levels of use can the observed soil and plant systems withstand before long-term degradation results?
- Do the sizes of these impacted areas result primarily from ecological factors such as the lack of resistance of the substrate, or from use-related and behavioral factors such as the size of groups and camping practices?
- How can overnight use be best directed to the prevalent resistant substrates to minimize future expansion of current sites and the proliferation of new impacts?

## Conclusions

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Both of these areas have experienced some resource degradation, and increases in future visitation are likely to result in additional biological changes. These results document the extent, location, and characteristics of the current resource impacts in an effort to foster appropriate management and visitor education strategies.

In Prince William Sound, vegetation loss was high in both the beach grass and forest understory communities. However, established sites on the exposed beach gravel are highly resistant to additional use and, whenever possible, visitors should camp on these sites exclusively. Multiple trailing, damage to trees, and the presence of camping trash was noted at a majority of sites, and these impacts could be mitigated through minimum-impact visitor education.

In Baja California Sur, a high degree of vegetation loss and large campsites were observed. Though the reasons for such large sites remain unclear and should be examined, directing visitors away from fragile desert plant communities and to exposed sandy substrates could be an effective strategy for limiting impact. Improper disposal of human waste, damage to shrubs and multiple trailing were common problems at these sites, and these challenges could be mitigated through management actions and visitor education.

For both areas, established monitoring protocols seemed appropriate with some modifications. With similar modifications, it is likely that these protocols would be applicable to many ecosystem types.

In light of the trend toward increased visitation, both of these areas seem well suited for the development of containment types of visitor management strategies. The specific approach should be appropriate for the type of use in the area and should strive to maintain a high quality visitor experience.

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# An International Wilderness Management Scale: a Common Language for a Common Heritage

Peter A. Christian

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**Abstract**—Managing wilderness for nondegradation requires a framework for stabilizing biophysical and sociological conditions. An international wilderness management scale is proposed to provide a spectrum of classes based on quality and quantity standards. These standards comprise anchor points that define classes and fix them on a wilderness continuum. The idea of anchoring the undeveloped end of the continuum by using core areas is introduced. The Scale is presented as a common language to coordinate management and research on an international basis. Wilderness definitions and universality are discussed. Without standards, the term “wilderness” will continue to be meaningless as a management concept.

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A central tenet of wilderness management is the concept of nondegradation: the obligation to maintain the natural conditions of wilderness in an undegraded state (Hendee and others 1990). Highly developed trail systems, overcrowding, user conflicts, fewer opportunities for solitude, and a host of unsolved problems arising from the human use and occupancy of wild lands suggest a failure of management on a fundamental level (Vento 1988). From the perception of the user, many wilderness areas have been severely altered over time through management programming, which changes the original recreational opportunity to a less wild condition. The effect is to attract larger numbers of users who prefer more development, causing a loss of wildness and a greater impact on the wilderness experience and the ecology of the area. This is called social succession and is defined as the invasion, succession, and displacement of wild conditions by less wild ones (Clark and Stankey 1979).

Social succession presents a major challenge to managers because, at present, there are no specific guidelines for stabilizing an area at the level of wildness at which it was designated. Ironically, this de-evolution in natural conditions is directed, often unknowingly, through management actions, primarily by physical development (access and facilities). Because there is a greater percentage of the general population that prefers less wild experiences, there

will always be pressure to move toward the more developed end of the continuum. While social succession has been allowed to run unchecked, management has also typically derailed the ecological evolution of wilderness areas by removing agents of ecological change such as predators, fire, floods, insects, and diseases. Instead of managing for nondegradation and allowing these areas to maintain their own dynamic equilibrium, as well as working to “freeze” social succession, the reverse has occurred. Under current and past management regimes and despite the homage paid to the concept of nondegradation, wilderness has become a “body without a soul.”

The de-evolution in the social conditions within wilderness usually results in a never ending spiral toward the less wild. The erosion of wilderness often occurs over long periods of time, and is so subtle that few individuals realize that changes have taken place until it is too late to reverse the process. Despite the efforts of managers and researchers, wilderness areas around the world continue to suffer from incremental development and the attendant social succession, resulting in a gradual loss of their wild character. In order to freeze these areas sociologically to maintain the level of wildness for which they were originally dedicated, we need to better understand the linkage between management inputs and visitors’ perceptions of wildness.

## The Rationale

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A significant contributor to the difficulty in managing wild lands is the inherent elusiveness of the word “wilderness.” “Wilderness has a deceptive concreteness at first glance. The difficulty is that while the word is a noun it acts like an adjective” (Nash 1982, p. 1). Wilderness (the noun) refers to the physical condition of the land; it is fragile and undergoes physical change and can be destroyed by a variety of activities. Wilderness (the adjective) is a state of mind, an idea; it adapts to meet the needs of the imagination.

Because wilderness poses so many discouraging barriers to easy definition, Nash warns that it is tempting to allow the term to define itself and to accept as wilderness those areas people call wilderness. This is the case today throughout the world as managers, and the public they serve, label their recreational and undeveloped wild lands as wilderness. The difficulty this poses is that labels without definitions are meaningless for purposes of managing for nondegradation. Incredibly, managers have no common language in which to objectively communicate with one another about wilderness. Intuitively, we understand the concept, but the reality eludes us. Managing wilderness without common benchmarks for current conditions virtually ensures that

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over time, as management regimes and social values change, so too will wilderness.

In 1977, the first World Wilderness Congress was convened to provide “a platform for all aspects of the need for and difficulties concerning wilderness, including the world-wide evolution of wilderness definition” (Hendee and others 1990, p. 89-90). Because of the difficulty in reaching consensus, few attempts have been taken to outline definitions, and definitions have been widely accepted as an international standard. This research suggests it would be useful to consider a variety of wilderness definitions existing on a continuum of opportunities from the “primitive to the paved” (Nash 1982, p. 6). The wilderness management scale proposed here sidesteps the need for consensus by providing for the widest spectrum of interpretations, while protecting the most fragile conditions found at the far undeveloped end of the continuum. It accomplishes this by establishing distinct classes of wilderness based on quality and quantity standards.

How are we to standardize the definition of wilderness under such disparate national policies as the United States National Wilderness Preservation System, Canadian Provincial Wilderness Areas, the territorial wilderness of Australia, Italy’s tiny Wilderness Zones, and the Russian Republic’s Zapovedniki? While there will probably never be a single universal definition, wilderness can be placed into classes that reflect a variety of cultural values and personal tastes, based on agreed upon standards that are fixed in policy and applied consistently over time. This premise is the basis for the current research.

## The Scale

The challenge is to define appropriate management definitions for the differing levels of wilderness found around the world, and to solidify terminology into a document that is easy to understand, on an international basis. The International Wilderness Management Scale is based on the continuum concept most widely applied in the United States as the Recreational Opportunity Spectrum (ROS)—a concept that represents the opportunity for recreational experiences as a management continuum from primitive to modern (Driver and Brown 1978). Another example of the wilderness continuum concept can be found in the work being done with the Australian National Wilderness Inventory (Lesslie 1993; Miller 1995). My proposed Scale is designed to fit within this type of framework. As shown in figure 1, classes are arranged along a continuum from undeveloped to well developed. The Scale takes the Recreational Opportunity Spectrum concept one step further by segmenting the continuum into much finer gradations. Wild lands will be assigned a Wilderness Class. A hypothetical International Wilderness Management Scale is shown in figure 1.

The Scale not only divides the continuum into classes, it takes the process another step by describing the mix of managerial inputs and biophysical conditions found in each class. The first step is to define the most primitive end of the continuum, “anchor points” all could agree on, even if they may not be totally achievable (Frissel and Stankey 1972). Each class will be composed of three standards

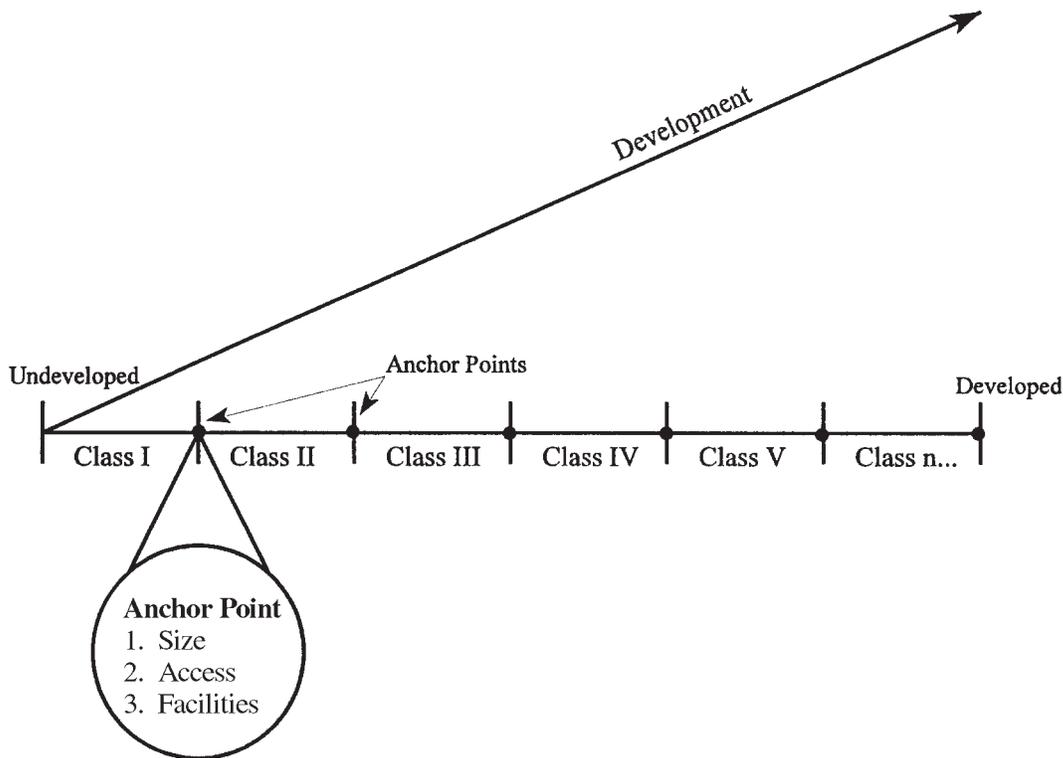


Figure 1—Hypothetical Wilderness Management Scale.

combined into an anchor point. The three standards constituting the anchor point are (1) size, (2) access, and (3) facilities. Using these three standards, managers will be able to identify their wilderness areas as belonging to one of the classes along the continuum. The anchor point for each of the classes will do just that—anchor the classes to a fixed location on the continuum, effectively freezing conditions. Each class will consist of a different mix of size, access, and facilities. Together, they constitute the International Wilderness Management Scale. It should be emphasized that in this Scale, wilderness refers not only to the naturalness of the ecosystem, but also the presence or absence of managerial programs that influence people's perceptions.

Anchor points are important for stabilizing the continuum because they are the key to understanding the effect managerial inputs will have on a wilderness area's eligibility for any given class. Future research could establish those intermediate segments in between anchor points. Classes of wilderness defined by anchor points will place wilderness on an absolute scale. Management decisions that change the mix of variables (size, access, facilities) would result in a class shift along the continuum (usually toward the more developed end) to a new anchor point and thus, a new class which best fits the new conditions.

## Class I: the Core Area

The core area identifies a hypothetical wilderness condition where large scale ecological processes operate unhindered and no means of access or transportation exist other than that provided by the natural world (Callicott 1995; Foreman 1994; Noss and Cooperrider 1994). The Class I anchor point is the foundation for the entire Wilderness Scale because it fixes the primitive end of the wilderness continuum and keeps it from shifting through time toward more development. The Class I core area can be viewed as a baseline wilderness by which change throughout the rest of the model can be gauged. Such areas would provide what Aldo Leopold described as a "...base-datum of normality for a science of land health" (Leopold 1949, p. 196).

Because the standards comprising its anchor point are quite high, there are probably very few wilderness areas left on the planet that qualify. Core areas would be very large and allow no facilities, trails, visitor centers, habitations, or any other type of management inputs (USDOS 1990). For wilderness recreation, the core area concept defines the "purist" wilderness condition and is the one most sensitive to management programming. Ironically, Class I brings wilderness management full circle by establishing the type of draw-a-line-around-it-and-leave-it-alone policy first envisioned by early conservationists (Lucas 1973).

The Class I core area idea is important because there is currently no form of wilderness scale by which managers can ascertain what type of wilderness they should be managing for. Cole (1996) suggests that at the heart of this predicament are questions regarding the value of wilderness as a reference area or "baseline" and what wilderness should provide a reference to. Without core areas to act as controls, wilderness will continue to devolve to fit the values, consensus, and attitudes of the time. While future societies may decide that wilderness values are no longer

important, they will at least be aware of what is being sacrificed: a varied and unique wilderness continuum that, once gone, can never be recaptured.

## Beyond Class I: Extending the Wilderness Continuum

The viability of an international wilderness scale relies on its universal applicability. The system must not exclude any reasonable national or cultural interpretation of "wilderness." If we agree with Nash (1982) that wilderness is a "state of mind," then we must allow for multiple perceptions of wilderness (Kliskey 1993; Lesslie and Taylor 1985; Lucas 1964). Multiple states of wilderness require a range of wilderness management classes. Toward this goal, the Scale is flexible on the modern end of the continuum and is designed so that additional classes can be added onto the existing continuum without jeopardizing the quality of natural conditions found at the primitive end. In other words, the Scale permits us to push the envelope of what wilderness is without endangering it.

Of course, there is a threshold beyond which it's meaningless to call a landscape wilderness. By any reasonable standard, at some point landscapes stop being wilderness and become something else, for example, traditional Japanese gardens, pastoral English landscapes, or New York City's Central Park. Just as we know intuitively that wilderness is predominantly a natural condition, we also know that a preponderance of civilization is not wilderness. The success of the Scale will rely on the skills, knowledge, and judgment of professional wilderness managers who put the conservation of the area foremost when making decisions. While there must be some leeway allowed in the class ranges, the anchor points will ultimately bind the Scale together and hold the manager accountable for significant negative shifts in wild conditions.

## Anchor Points

While it is obvious that there are a host of additional variables that influence perception, behavior, and participation, the three variables of (1) size, (2) access, and (3) facilities are proposed as the critical factors that should define each anchor point. The anchor points establish the standards by which each Wilderness Class can be managed. What follows is an examination of each of the three standards forming the anchor point in order to illustrate their importance in helping to "anchor" the classes to the continuum. Once standards are established, wild lands can then be assigned to a particular wilderness class using the size, access, and facilities to be found there.

**1. Size**—Size is proposed as the most important of the three variables defining an anchor point. Theoretically, given an infinitely large wilderness anything is possible. For example, a wilderness area the size of Antarctica could sustain a great deal of impact from a variety of sources and still be considered a wilderness. Whereas an area relatively small in size has very little tolerance for inputs that would erode it. Two measures for establishing size standards for wilderness have been proposed. Noss (1994)

refers to these as (1) area requirements for large carnivores and (2) area requirements for natural disturbance regimes.

Aldo Leopold understood that a vigorous population of large carnivores is one sign of a healthy ecosystem. Since carnivores are usually at the top of the trophic food chain, it is reasonable to consider them the keystone species of almost any ecosystem, and thus supreme indicators of success in conservation (Noss 1994). It has been estimated that large carnivores require between 2.5 to 25 million acres of habitat, depending upon the ecosystem and the species. In North America, for example, brown bears require more habitat than any other large carnivore. Assuming a minimum viable population of 50 individuals, Hummel (1990) estimates that grizzly bear populations in Canada require an average of 12.1 million acres. Noss (1994) estimates that in the Rocky Mountain region of the United States, four bears occupy approximately 100 square miles and that a viable bear population would require a minimum of 2,000 individuals. Therefore, a minimum viable population for bears in North America would require nearly 32 million acres of habitat.

In addition to maintaining healthy populations of carnivores, how big does a wilderness area need to be to maintain a natural disturbance regime? Studies indicate that bigger is better. Although no specific size can guarantee a dynamic and stable ecosystem, "larger areas have a lower probability of major shifts in landscape dynamics caused by rare disturbance events" (Turner and others 1993). There is no magic number in determining how large an area needs to be relative to natural disturbance regimes. Large areas will minimize management problems because disturbance will not affect an entire area. Disturbances can be allowed to run their natural course without costly and intrusive suppression efforts (Baker 1992). A small area is vulnerable to many types of natural and manmade events including: fire (and its long time suppression), the introduction of exotic species, insect infestation, plant and animal diseases, and fragmentation by roads, dams, and fences. If an area is to maintain a stable ecosystem over time it must be large enough that only a relatively small part of it is disturbed at any one time. Pickett and Thompson (1978) defined this as a minimum dynamic area or the smallest area with a natural disturbance regime, which maintains internal recolonization sources, and hence minimizes extinction. In other words, a minimum dynamic area should be able to manage itself and maintain habitat diversity with no human intervention (Pickett and Thompson 1978).

Minimum viable predator populations and a minimum dynamic area for landscapes establish a basis by which to determine a standardized size range for each wilderness class. Size ranges will vary from ecosystem to ecosystem, but the principle will hold in all of them for determining wilderness classes. For example, a Class I wilderness anywhere in the world will be at least big enough to allow for large-scale ecosystems to operate unhindered, including the healthy presence of its keystone species.

Smaller areas offer little in the way of providing a buffer for solitude and remoteness from civilization that larger areas can. Because larger wilderness areas are more effectively "buffered" from surrounding lands (Botkin 1990), Classes I through III wilderness would probably be selected from larger areas, while smaller areas would occupy the

other classes on the continuum. In the North American example, the standards for Classes I through III would require a minimum size standard ranging somewhere between 2.5 and 30 million acres, which is large enough to accommodate an ecosystem's most sensitive keystone species: bears and wolves. Areas smaller than this would probably never be eligible for Classes I through III wilderness designation in North America. While they may retain some of their natural character, they are simply too small to be considered wilderness in ecological terms because they are not big enough to harbor a complete representative ecosystem with native flora and large fauna, including the top-level carnivores. Nevertheless, the smaller classes play an important role in providing a wide range of less wild opportunities.

The existence of wild animals and unmodified landscapes is recognized as an important psychological aspect of the perception of wilderness (Botkin and Keller 1995). Lois Crisler (1973, p. 34) wrote, "wilderness without wild animals is mere scenery." Increasingly, scientists are discovering that the problems of wilderness management and ecosystem management are inextricably linked because many of the factors that impact wildlife also impact wilderness users. Roads, trails, facilities, access, and crowding affect wilderness recreationists just as they do wildlife because each represents an encroachment into wild spaces. If the presence of carnivores is one of the accepted criteria for determining the health of biophysical wilderness, then it is possible to consider wilderness purists as playing an analogous role as the keystone species for determining the health of sociological wilderness. If purists are a keystone species, then their displacement could indicate degradation of the conditions influencing their perception of wilderness (Noss 1994). Like top-level carnivores, the displacement of purists could indicate a change in the health of the ecosystem.

**2. Access**—The access variable is critical because it determines both the number and type of individuals who are attracted to and use a particular wilderness area, as well as how it is used. Access is a critical component because, given enough of it, access can eventually overwhelm any wilderness regardless of its size. Access is described as conveyance along roads, rivers, trails, and cross-country travel on foot, or by means of cars, ATVs, pack animals, water, and aircraft. How these various means and methods of conveyance are designed and managed is important in defining the range of access systems. For example, trails and roads can be designed as "high standard systems," requiring intensive maintenance or they can be designed as low standard, needing little or no maintenance (Clark and Stankey 1979).

Access also provides the key to good natural resource protection. Decisions need to take into account the effect of trails on endemic, threatened, or endangered species (McCool 1988). Improperly designed and maintained trails can lead to erosion on unstable soils, habitat loss, and the degradation of alpine meadows and wetlands. If properly designed and implemented, the trail system can influence how and how much a wilderness area is used. Since 80 to 90 percent of wilderness use is by trails (Hendee and others 1990), trail location, design, and maintenance may be management actions that critically affect social norms. In other words, the type of trail determines the type and number of users.

Thus, maintaining naturalness and outstanding opportunities for solitude depends on how we manage trails. The literature indicates that among wilderness users, there is a spectrum of preferences for trails ranging from highly developed to no trails at all. For example, users of forest lands with roads are there because they prefer a more primitive recreational setting than is typically found in developed campgrounds; they, too, vary in their preferences for paved or unpaved roads (Clark and Stankey 1979).

While improved roads leading to wilderness may attract more visitors, it is the location, design, and maintenance of trails within wilderness that are the wilderness manager's tools to direct and contain use, and to minimize impacts (Jubenville 1995). This idea is closely related to the concept of wilderness carrying capacity, which Jubenville defines as the "...cumulative recreational use pattern and related impacts within an area in response to managerial programs." This describes a cause-effect relationship where the recreational use pattern on a trail system depends on the managerial inputs that make up the trail system. Improvements in the trail system may cause a shift in the recreational use pattern. Changes in managerial inputs (such as those that constitute the transportation-access system) probably has the greatest influence on whether an area shifts from one wilderness class to another.

Managers need to consider ahead of time what type of trail system is needed: modern, intermediate, primitive, or none. The more intensively managed a trail system becomes the more it changes perceptions of a particular wilderness opportunity. Factors such as trailbed materials, trail signs, and footbridges are all a part of the access system within an area. The specific trail construction standard used reflects the type of recreational opportunity provided (Jubenville and Twight 1993; McCool 1988). They are management inputs that create a particular recreational use pattern. Easy access allows more people entrance to wild areas which, in turn, affects solitude and perceptions of naturalness and crowding. If the manager of an undeveloped wilderness (say Class III that requires low use, low density, and low environmental impact patterns from that use) is obligated to manage for nondegradation, then the access variable needs to be maintained at its present level. If an area is without trails, it probably should remain without trails unless there is a compelling reason for trails.

**3. Facilities**—Facilities are defined as those inputs, managerially determined, that are designed to accommodate visitor use or to protect the resource. Facilities are likely to "co-vary" with levels of access. In other words, there is a two-way relationship between access and facilities where more of one generally leads to more of another. Therefore, varying levels of facilities such as toilets, developed campsites, fire rings, wells, and interpretive stations may be acceptable in a Class V or VI wilderness, but not in Classes I through III.

Facilities, such as designated campsites, play an important role in influencing the perception of naturalness in the minds of the visitor. Eventually, as more and more people are attracted to the improved campsites, managers will feel compelled to upgrade the trail to accommodate the heavy use. If managers make access easier, more visitors are likely to use a particular trail that leads to a particular

natural attractor. As the level of use goes up, pressure on the resource also increases. More visitors mean greater erosion, soil impaction, trampling, and the development of social trails. Popular campsites, creek crossings, and natural attractors become worn, understory vegetation suffers, and negative social inputs increase. Finally, managers perceive the need to protect the resource or are forced to respond due to overwhelming visitor complaints. Often a stop-gap plan is instituted under the guise of resource management, where managers harden sites as more visitors enjoy an area. There is also a greater need for information and interpretive services, regulations, law enforcement, and maintenance (Jubenville and Twight 1993). This is social succession at its most destructive pace. As each user group is displaced by constantly de-evolving wilderness conditions, that particular wilderness area moves down the continuum to a different class. Under the nondegradation mandate, this result indicates a failure of management to realize the critical link between managerial input and user perception.

## Conclusions

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Universality is an important attribute of the Scale if we are to consistently manage wilderness and communicate research findings and concerns in a global context. While managers and visitors may have different visions of wilderness, it is important to have at least some objective minimum standards by which informed decisions can be made (Nash 1982). If wilderness managers are truly dedicated to the concept of nondegradation, then they must also understand that without reasonable standards there is little hope of stabilizing wilderness at current levels. A spectrum of wilderness classes can provide the framework while effectively stabilizing the wilderness continuum from degradation of biophysical and sociological conditions.

This discussion offers a starting point toward establishing working definitions of wilderness in order to improve its preservation and facilitate communication between managers and the public they serve. With an International Wilderness Scale, recreationists, scientists, managers, and administrators would be able to communicate in a common language, and specific classes of wilderness along the continuum would have the same meaning worldwide. Managers could better understand where their lands lie on the continuum, where they want to be on the same continuum, and how to achieve it. From that point it would be easier to communicate among interested parties, and easier to coordinate management and research on an international basis.

To impose a strictly Western definition of wilderness on non-Western cultures is ultimately self-defeating (Gomez-Pompa and Kaus 1992; Klein 1994). Any international standard that seeks to exclude another society's idea of wilderness is bound for failure through a lack of cultural context (Callicott 1995). For example, Westerners view wilderness as empty lands free from human occupation. But in many indigenous cultures there is no word for wilderness because there is no significant dichotomy between humans and their environment. Conflicts arise where management fails to take these peoples' notions of wilderness seriously. This research

does not recommend perpetuating the myth of wilderness as an “empty stage” (Young 1992). The idea of empty wilderness was only made possible from the artificial depopulation of the “frontier” by disease, war, and cultural assimilation. The impact this has on wilderness management is the idea that the permanent human habitation within wild lands does not necessarily destroy its character. This view is encouraged by indigenous peoples who believe that since the human race evolved within wilderness, incorporating a human element into wilderness policy is the only acceptable way of managing it.

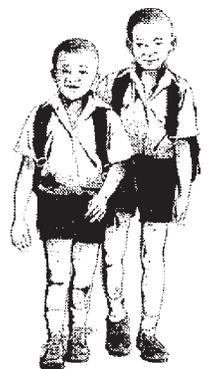
In the proposed Wilderness Scale, the standards of size, access, and facilities define the anchor points that differentiate between and create the standards for wilderness classes. While creating standards based on these three variables may be a crude start, fine tuning the system will inevitably lead to improvements. The idea remains to firmly anchor the extremely undeveloped end of the wilderness continuum to a set of standards that prevents the erosion of both biophysical and sociological conditions. The concept of a core area and buffer zone advocated by The Wild Lands Project gets to the heart of this idea (Foreman 1994; Noss 1994). The core area represents the remote and wild portion of the spectrum of wilderness opportunities available, and it is this region of the continuum that the Scale is primarily designed to protect. Further along the continuum, other anchor points are established that define classes of wilderness with less demanding standards for size, access, and facilities. Near the well-developed end of the continuum, wilderness classes would include smaller areas or areas that have experienced extensive modification. A range of anchor points in between could provide a yardstick for management and allow for the inclusion of a relatively broad interpretation of wilderness because it defines wilderness in degrees.

While the choice of variables can be disputed, the fact remains that without finer distinctions of wilderness, based on classes that are clearly defined by standards, wilderness will continue to erode until it is unrecognizable as such by the present generation. Without some type of standard, wilderness will continue to be meaningless as a management concept.

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# VII. The Future of Wilderness: Challenges of Planning, Management, Training, and Research





# Wilderness Information Needs in the Age of Cyberspace

Charles Burgess  
Wayne Freimund

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**Abstract**—As the institution of wilderness rapidly enters the information age, various subcultures of people associated with wilderness (managers, advocates, academia, and wilderness users) desire access to information on the World Wide Web. A thorough knowledge of these audiences and their information needs is a necessary first step. A needs assessment survey was conducted both online and by telephone to gather sociodemographic and information needs from respondents. Results indicate that respondents desire access to a broad range of information, and that there is considerable agreement on the type of information that would be useful. The information category, “Management issues and potential solutions,” was given the highest overall rating by respondents. Further investigation is required to determine why some people adopt the use of this new technology sooner than others.

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We end, I think, what might be called the standard paradox of the 20th century: our tools are better than we are, and grow better faster than we do. They suffice to crack the atom, to command the tides. But they do not suffice for the oldest task in human history: to live on a piece of land without spoiling it (Aldo Leopold).

When Leopold first wrote these words in 1938, it may have been difficult for him to imagine the rapid pace of change that has occurred within the past 20 years. Though many have benefited by advances in technology, others have pointed out the costs associated with it; for example, machines taking over the jobs of people, and the shift from a production-oriented society to one that is service-oriented. Adjusting to such rapid change is becoming a survival strategy for many people. The various subcultures of people associated with wilderness (managers, advocates, academia, and wilderness users) are not immune to such changes. This rapid pace of change has the potential to drastically affect not only how wilderness is perceived by society, but also how it is managed.

This paper follows from the proposition that we are rapidly moving into an information age. Toffler (1990) would characterize this change as a “powershift.” He describes the new system for power creation in society as one where

information plays a dominant role; the system is dependent on instant communication and dissemination of data, ideas, symbols, and symbolism. Assuming Toffler is correct in his forecast, then wilderness supporters must embrace the era of information and become an active participant.

The purpose of this paper is to help ease the transition to the “powershift” by providing the wilderness community with a description of the types of wilderness information that are currently demanded on the World Wide Web (WWW). Equipped with this information, wilderness communities can better target their messages and assemble appropriate information to disseminate on the Internet. This paper addresses the following questions: First, who is the audience for wilderness information? Second, what are their information needs?

## Setting the Stage

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The rapid pace of change in our society can be seen all around us—from the opening of eastern block countries to the western world, to the switch to a global economy that relies upon service-dominated industries. In fact, the world seems to be organizing itself globally. Nowhere is this globalization more evident than in the world of communications. Television signals, telephone voice transmission, and even some college courses are now conducted through electronic means. The implication of this mass movement toward the digital world is near-instantaneous access to media sources once difficult to uncover. One of the fastest growth sectors in the United States today is small business entrepreneurs who conduct their transactions through the Internet. Many businesses no longer need to be located in major metropolitan areas because it is possible to live in remote rural areas and conduct business online.

The Internet and especially the WWW, a subset of the Internet with broad graphical capabilities, will continue to rise in prominence as more people buy computers and modems. It has been projected that 16 percent of all commerce will be conducted through the Internet by the year 2000 (Killen 1996). Issues of privacy and standards are currently preventing the Internet from reaching its true potential, but these issues are being dealt with by government commissions and industry agreements.

## Institutional Change

Institutions are at the backbone of our society. An institution, as defined by the American Heritage Dictionary is “A custom, practice, relationship, or behavioral pattern of importance in the life of a community or society.” Because wilderness holds such a prominent place in the American

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psyche (Nash 1982), for the purposes of this paper, wilderness is considered an institution. Institutions respond notoriously slow to change (Stankey 1997). Stankey notes three primary barriers to institutional change: procedural, normative, and structural or process barriers. Procedural barriers are formal rules that regulate organizational behavior. The example mentioned by Stankey is the Federal Advisory Committee Act of 1972. This Act was designed to constrain agencies from inappropriately excluding certain public interests from decisionmaking, but has inadvertently had the effect of stifling the development and creativity of advisory groups. Normative barriers concern the role of science and knowledge in decisionmaking. Traditionally, scientific measurements and quantitative studies would form the basis for decisionmaking. But increasingly, other ways of knowing, including local knowledge and qualitative assessments, have gained a greater acceptance among decisionmakers. The third category of institutional constraints derives from organizational structures and processes. These structures and processes can both promote and hinder the use of knowledge in decisionmaking and affect the interaction and communication between entities.

The form of constraint relating to organizational structures that govern the institution of wilderness is based upon the shared feeling among many that wilderness should continue to be appreciated and managed in the same way it was in 1964, the date of the signing of the Wilderness Act. Wilderness is founded upon the notion that we need to have places on earth that are wild and free from the trappings of modern society. In essence, wilderness may serve as a sanctuary from modern technological progress. Whenever modern technologies like Geographic Positioning Systems, cell phones, and laptop computers find their way into wilderness, they conflict with this value. Some wilderness purists have called for places on the earth that are not mapped to create in the visitor a "true" sense of adventure. Others have called for banning cell phones and laptops from wilderness areas altogether. Although "virtual wilderness areas" are being constructed in shopping malls, and wilderness information abounds on the WWW, there is still a great deal of disdain toward many for these 20th century technologies. The extent to which the institution of wilderness will reject modern communication mediums such as the Internet is one of the questions addressed by this research.

## Wilderness Information on the World Wide Web

A recent search on the World Wide Web on the word "wilderness" yielded over 16,000 URL's (or Universal Resource Locators) from government agencies, environmental organizations, and the recreation industry. Wilderness and recreation sites abound on the WWW. Each of the United States Federal agencies that manage federally protected wilderness (the Forest Service, the National Park Service, the Bureau of Land Management, and the Fish and Wildlife Service) provides information about individual wilderness areas, and in some cases, provides maps and other resources for the interested hiker, boater, or "websurfer." Other information sources include companies selling products or providing information, and websites set up specifically to

provide recreation information while selling advertisement space on their site. In some cases, the information is of high quality, in others it is out-of-date, inaccurate, or of questionable appropriateness. In an attempt to create some cohesion in the digital world as it relates to wilderness, Freimund and Queen (1996) proposed a wilderness information network that would enhance the potential for wilderness electronic communication by linking the various wilderness subcultures and creating a forum to exchange ideas. The goal would be to provide an organized location from which accurate, useful information could be accessed to aid in meaningful dialogue among the various subcultures.

As a first step in the creation of a Wilderness Information Network, a study was conducted to determine what types of wilderness information various audiences would find beneficial. This "needs" assessment sought to answer the question, "How useful would different types of wilderness information be if they were made available online through an interactive website?" Determining the characteristics of the audience was a secondary aim of the study.

## Wilderness Information Needs Assessment

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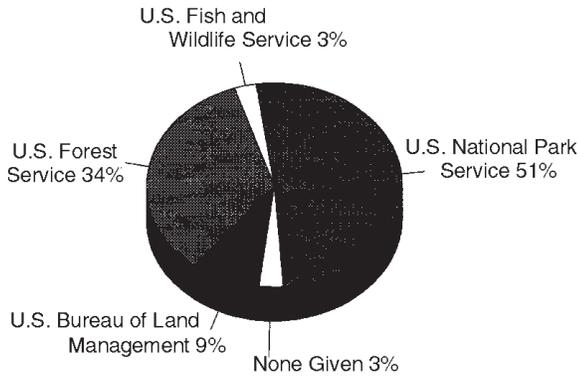
A needs assessment survey was conducted from January through April of 1997 to identify types of wilderness information that wilderness managers and the general public would find useful if it were delivered online through a site on the WWW (the complete survey instrument is available at <http://www.wilderness.net/survey.htm>). The survey was conducted online through an interactive website and through a telephone survey of wilderness managers from the U.S. Forest Service, the U.S. Fish and Wildlife Service, the U.S. National Park Service, and the U.S. Bureau of Land Management. The use of both WWW-based and telephone methods of eliciting responses was necessary to include both WWW users and nonusers. Managers contacted by phone, who were self-identified as WWW users, were asked to go to the website to fill out the online version. The total number of respondents for the online survey was 154; those contacted by phone numbered 35 (fig. 1).

## Methods

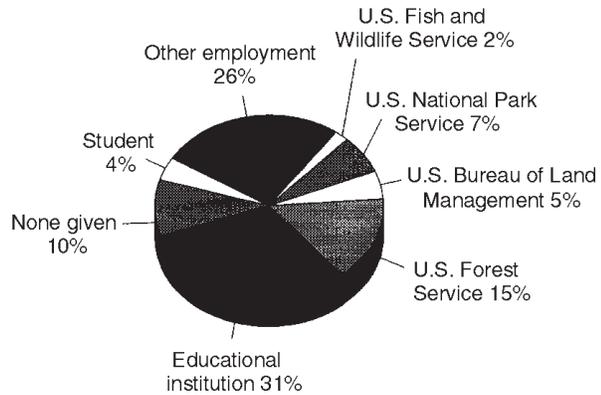
The online sample was a nonprobability sample of self-selected participants and, therefore, may not adequately represent the entire population of individuals interested in obtaining information. Announcement of the existence of the survey was sent out to various search engines, including "Yahoo" and "Alta Vista," so that a potential respondent could conduct a search on "wilderness" and find a link to the site. Responses were also collected through messages sent out through newsgroups (such as *rec.backcountry*), agency electronic bulletin boards, and by electronic mail to managers, researchers, and students who were known to the researchers to have an interest in wilderness.

The Arthur Carhart National Wilderness Training Center provided the researchers with a random sample of wilderness managers who were surveyed by telephone. In some cases, a contact person was provided on the list, in other

**Telephone Survey N = 35**



**Internet Survey N = 154**



**Figure 1**—Percent of the total response by agency and other category. Total N = 189.

cases, the interviewer would call the agency unit that manages wilderness or a wilderness study area and ask to speak with a wilderness manager. These individuals held various job titles, including District Rangers, Wilderness Coordinators, Wilderness Specialists, Wilderness Education Coordinators, Resource Area Coordinators, Recreation Specialists, and Recreation Planners. The response rate for the telephone sample was 100 percent.

### Description of the Sample

The sample of respondents who filled out the needs assessment were highly educated. Forty percent held bachelor's degrees and 41 percent held master's degrees. Only 18 percent had less than a bachelor's degree. Seventy-seven percent of the respondents were male and 23 percent female. The mean age of all respondents was 40 years old. Thirty-seven percent of respondents were between 41 and 50 years of age.

### General Wilderness Information Needs

Respondents were asked to rate how beneficial 35 different types of wilderness information would be if delivered through a website. Overall, the sample obtained through the online survey responded more favorably to a greater variety of information than the sample of managers who do not use the WWW. The following analysis compares the relative benefit of the types of wilderness information listed on the survey instrument across employment categories. Tables displayed in this section indicate only wilderness information rated "Highly beneficial" by the sample, and are reduced to only those rated by 50 percent or more of respondents.

For the entire sample, 14 types of information were considered highly beneficial to 50 percent or more of the respondents (table 1). "Management issues and potential problems" received the highest response (69.4 percent). "Recreation impacts/ecology research" rated second (68.3

percent), followed by "Discussion area for various wilderness issues" (63.2 percent).

A comparison of WWW users with wilderness managers who did not use the web revealed the following differences (tables 2 and 3). First, there were fewer categories of information rated "Highly beneficial" by the latter group (12 compared with 16). Second, "Maps of wilderness areas" was ranked seventh for the WWW group and unranked for the non-WWW group. Two information types, "Monitoring issues/procedures" and "Wilderness management training materials," were included in the manager list and absent in the other. This is to be expected due to the audience-specific nature of these two items.

Managers with WWW experience, when compared with those without experience, have somewhat different information needs. Those with no WWW experience (table 3)

**Table 1**—Types of wilderness information rated "Highly beneficial" by the entire sample.

Type of wilderness information	Frequency	Percent
Management issues and potential solutions	129	69.4
Recreation impacts/ecology research	127	68.3
Discussion area for various wilderness issues	117	63.2
Wilderness ecology issues	112	60.2
Leave No Trace program information	107	57.5
Wilderness-related legislation	105	57.4
Rules and regulations for specific wilderness areas	104	56.2
Site restoration techniques	101	54.6
Wilderness management policies of agencies and tribes	98	53.0
Solitude/crowding research	97	52.4
Current events in wilderness	97	52.2
Maps of wilderness areas	93	50.5
Wilderness philosophy	93	50.0
Recreation behavior research	93	50.0

**Table 2**—Types of wilderness information rated “Highly beneficial” by all WWW users.

Type of wilderness information	Frequency	Percent
Management issues and potential solutions	107	70.9
Recreation impacts/ecology research	102	67.5
Discussion area for various wilderness issues	98	65.3
Wilderness ecology issues	91	60.3
Leave No Trace program information	85	56.3
Rules and regulations for specific wilderness areas	83	55.3
Maps of wilderness areas	82	55.0
Wilderness-related legislation	82	55.0
Current events in wilderness	81	53.6
Wilderness management policies of agencies and tribes	79	52.7
Recreation use trends	78	51.7
Solitude/crowding research	77	51.3
Wilderness philosophy	77	51.0
Site restoration techniques	76	50.7
Recreation behavior research	76	50.3
Ecological research	75	50.0

include “Leave No Trace information,” “Rules and regulations,” “Solitude/crowding research,” and “Wilderness management training materials,” whereas the managers with WWW experience do not (table 4). Also, the managers with WWW experience include “Ecological research” and “Fire management issues,” while the inexperienced managers do not.

Overall, wilderness managers rated “Management issues and potential solutions,” “Recreation impacts/ecology research,” and “Site restoration techniques” as their three most beneficial information needs (table 5). The non-agency portion of the sample (table 6) includes individuals at educational institutions (43.6 percent), students (5.5 percent), and all others who filled out the survey (36.4 percent) who have wilderness information needs. “Management issues and potential solutions” is again rated the highest,

**Table 3**—Types of wilderness information rated “Highly beneficial” by managers with no WWW experience.

Type of wilderness information	Frequency	Percent
Recreation impacts/ecology research	25	71.4
Site restoration techniques	25	71.4
Wilderness-related legislation	23	67.6
Leave No Trace program information	22	62.9
Management issues and potential solutions	22	62.9
Wilderness ecology issues	21	60.0
Rules and regulations for specific wilderness areas	21	60.0
Monitoring issues/procedures	20	58.8
Solitude/crowding research	20	57.1
Wilderness management policies of agencies and tribes	19	54.3
Discussion area for various wilderness issues	19	54.3
Wilderness management training materials	19	54.3

**Table 4**—Types of wilderness information rated “Highly beneficial” by managers with WWW experience.

Type of wilderness information	Frequency	Percent
Management issues and potential solutions	36	80.0
Recreation impacts/ecology research	32	71.1
Discussion area for various wilderness issues	31	70.5
Site restoration techniques	29	65.9
Wilderness management policies of agencies and tribes	29	64.4
Wilderness ecology issues	28	62.2
Monitoring issues/procedures	26	57.8
Wilderness-related legislation	25	55.6
Ecological research	24	54.5
Fire management issues	24	54.5

followed closely by “Maps of wilderness areas” and “Discussion area for various wilderness issues.” This group rated more items “Highly beneficial” than any of the other groups (17 percent). The placement of “Maps of wilderness areas” and “Rules and regulations” toward the top of the list for this group reflects their desire for concrete and immediately useful information concerning wilderness areas.

Respondents were asked to list up to three environmental organizations they would like to see issue positions. The top 10 organizations are listed in table 7. Some respondents described the type of organization that should be represented. “Wise use” groups were listed four times; local organizations were listed twice.

## Comments

The final question on the survey encouraged respondents to provide feedback concerning the survey or the Wilderness Information Network project. Approximately half of all respondents (46.5 percent) provided comments.

Some managers believe the project is a positive step because the WWW is the medium of choice for many in the world, and this would be an effective way to reach them.

**Table 5**—Types of wilderness information rated “Highly beneficial” by all wilderness managing agency personnel.

Type of wilderness information	Frequency	Percent
Management issues and potential solutions	55	73.3
Recreation impacts/ecology research	54	71.1
Site restoration techniques	52	69.3
Discussion area for various wilderness issues	48	64.0
Wilderness ecology issues	47	61.8
Wilderness-related legislation	45	61.6
Wilderness management policies of agencies and tribes	45	59.2
Monitoring issues/procedures	43	58.0
Leave No Trace program information	42	55.3
Solitude/crowding research	40	52.6
Ecological research	39	52.0
Rules and regulations for specific wilderness areas	38	50.0

**Table 6**—Types of wilderness information rated “Highly beneficial” by the general public (including those at educational institutions).

Type of wilderness information	Frequency	Percent
Management issues and potential solutions	62	67.4
Maps of wilderness areas	61	66.3
Discussion area for various wilderness issues	60	65.9
Recreation impacts/ecology research	61	65.6
Rules and regulations for specific wilderness areas	57	63.3
Leave No Trace program information	57	62.0
Wilderness philosophy	56	61.5
Wilderness ecology issues	55	59.8
Wilderness-related legislation	53	58.9
Current events in wilderness	54	58.7
Wilderness curriculum guide for all grade levels	51	58.0
Recreation use trends	52	57.1
Interactive data bases	48	56.5
Wilderness management policies of agencies and tribes	46	53.5
Recreation behavior research	49	53.3
Solitude/crowding research	47	52.8
Economic impact research	47	52.2

The benefits of using the WWW as a tool for interacting with other agencies and units within agencies were mentioned frequently by the manager group. Some managers are concerned about the information overload that might result from the project, others think that it might further distance managers from the land. One respondent questioned if the creation of a “virtual wilderness” is something we should promote.

Many respondents, during the course of being interviewed on the telephone, expressed concern that any information provided by agencies could potentially be misinterpreted and bring trouble. They also expressed concern about the legalities of providing links to environmental groups.

The general public group also seems comfortable in their view that providing wilderness information on the WWW will be a positive step. Numerous respondents

**Table 7**—Top 10 environmental organizations respondents would like to see issue positions.

Environmental organization	Frequency
Sierra Club	64
Wilderness Society	42
Nature Conservancy	18
National Parks and Conservation Association	15
Wilderness Watch	14
Audubon Society	13
Southern Utah Wilderness Alliance	10
Earth First!	8
Greenpeace	6
Montana Wilderness Association	5

provided their names and addresses in case we wanted to contact them. A few respondents provided links on their own WWW sites to the Wilderness Information Network site. Still other respondents sent electronic mail to the researchers asking us to provide links to their sites and asking if they could list their research papers in our data base. Many respondents were excited about the opportunity to have a forum for communicating and interacting with fellow wilderness enthusiasts.

Some respondents provided additional information that they would like to see made available through the WWW. Among them were wildland urban interface issues and a job bulletin board. One respondent said that the information provided must go beyond the boundaries of the United States to be useful.

There were some cautionary comments, however; one respondent remarked that providing wilderness information on the WWW is an oxymoron; another remarked that the information must be accurate for it to be of any use. Still others thought the survey instrument asked some loaded and confusing questions.

## Conclusions

Two general statements about wilderness information can be derived from this needs assessment. First, respondents indicated that access to a broad range of information would be valuable. Second, there is considerable agreement on the type of information that would be useful. “Management issues and potential solutions” was rated the highest for all groups except for the managers with no WWW experience. Currently, the researchers know of no such resource in existence. A well-thought-out project possibly consisting of case studies would need to be created to fulfill this goal.

An online discussion area for various wilderness issues could take many forms. Among them, “newsgroups,” “chat rooms,” “listservs,” and videoconferences. Each format is unique in the swiftness of broadcast, the work necessary by system administrators to facilitate and guide discussion, and the reliance on expensive technology. Agency respondents expressed concern that not all of their communication should be open to the public. These types of privacy concerns have been and continue to be addressed by software developers.

All of the other information types listed as “Highly beneficial” already exist in some form and could be transformed for use on the WWW. The form this information takes must be well thought out, however, as mentioned by some respondents in the “Comments” section.

Forty-six environmental groups were listed by respondents to include in a Wilderness Information Network WWW site. The most popular responses were the Sierra Club, The Wilderness Society, and the Nature Conservancy. It is important to note, however, that many respondents either described or listed organizations usually not considered in the mainstream of the conservation movement. Suggestions included Earth First! and “Wise Use groups.” Some other respondents thought it important to list organizations from many different spatial scales, for example, local grassroots organizations, and regional and state organizations.

Some recurring themes in the "Comments" section are that respondents feel positively about the creation of a Wilderness Information Network. A place is needed on the WWW where wilderness research, education materials, and other information can be brought together in a common forum. Caution must be given, however, that an information "overload" is not created.

Understanding the demographics and information needs of the various wilderness subcultures has been an invaluable first step in creating a viable online wilderness community. The question remains, however, why do some people adopt the use of this new technology sooner than other people? Does it depend on the sociodemographic characteristics of the individuals, or is it more dependent on the communication channels they rely on to find out about new technologies? Further investigation is required to find the answers to these questions.

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# Wilderness Management on the World Wide Web: an Application in Authorware

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**Abstract**—Wilderness managers can access a computer-based, user-interactive program via the World Wide Web (WWW). The program is part of a distance education course offered through the Georgia Center of the University of Georgia in Athens, and was developed using Authorware Professional software. By incorporating sound, animation, visuals, text, and user interactions, the program provides explicit examples of wilderness concepts and applications in a dynamic, multimedia and user-friendly environment. Topics include the history of the wilderness movement in the United States (including major wilderness advocates), wilderness philosophies, and Federal agency involvement in wilderness management. Target audiences include private and public agency field staff, administrators, university academicians, and students.

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A computer-based, user-interactive, multimedia wilderness program will facilitate distance learning via the WWW. By incorporating sound, animation, visuals, text, model simulations, and user interactions, the program provides explicit examples of wilderness concepts and applications in a dynamic, multimedia, and user-friendly environment. Topics covered include a history of the United States wilderness movement (including major wilderness advocates), wilderness philosophies, and Federal agency involvement in wilderness management. The program is available on CD and can be accessed via the WWW at: <http://courses.arches.uga.edu/SCRIPT/REC331MT>.

Target audiences include private and public agency field staff, administrators, university academicians, and students. It is particularly appropriate for practitioners in the natural resource, outdoor recreation, and wilderness management fields who (a) are unable to attend conventional classes at colleges, schools, or universities or (b) work for agencies within or outside of the United States and are interested in training their staff through distance learning. The course could easily be incorporated into existing

distance education courses such as the Wilderness Management Correspondence Education Program (WMCEP) (Porter and Swain 1996) and other efforts to provide wilderness communication via the internet (Freimund and Queen 1996; Queen 1997).

## Conceptual Background

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While there continues to be debate concerning the role of media in influencing learning (Clark 1983; 1994; Kozma 1994), it has been argued that computer-based, multimedia instruction (involving interaction, sound, and animation) may facilitate learning opportunities by providing explicit examples of concepts and issues in a manner that users can easily comprehend (Jonassen and others 1994). In this regard, computer-based instruction is particularly valuable in situations requiring off-campus and distance education (Willis 1993).

One of the limitations in distance-learning through traditional media is that immediate feedback to users is not possible. Authorware addresses this limitation by (a) enabling users to simulate field exercises on the computer and (b) providing immediate feedback through interaction. The benefit of a computer-based wilderness education program is not to remove the instructor from the learning process; rather it changes the role of the instructor from the simple provider of information to the facilitator of information exchange.

This course, developed by the University of Georgia, complements several other wilderness communication and correspondence programs offered on the WWW by providing opportunities for user interactions and simulations of real-world scenarios and issues in wilderness and natural resource environments. For example, users are provided sufficient information to address recreation carrying capacity issues, as well as appropriate types of use, for wilderness and other outdoor settings. In other examples, knowledge is built and tested about specific areas in the United States National Wilderness Preservation System, major wilderness advocates and their philosophies, and Federal agency responsibilities for managing wilderness. By incorporating interactive exercises into a multimedia environment, the program enhances attention and provides the user with immediate feedback and responses to issues and questions. The type and extent of user interactions developed would be extremely difficult to achieve in previous nondigitized distance learning courses.

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In: Watson, Alan E.; Aplet, Greg H.; Hendee, John C., comps. 1998. Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management, and allocation, volume I; 1997 October; Bangalore, India. Proc. RMRS-P-4. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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# The Interim Management Dilemma: the High Peaks Wilderness Planning Process from 1972 to 1997

Peter Newman  
Chad P. Dawson

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**Abstract**—The High Peaks Wilderness in the Adirondack Park of New York State is one of 16 wilderness areas within the Adirondack Park that was designated in 1972 by the New York State Legislature. Over the last 25 years, several versions of a proposed High Peaks Wilderness Unit Management Plan have been drafted, discussed in public review, and recommendations made by a Citizen Advisory Committee. To date, no plan has been approved, leaving the New York State Department of Environmental Conservation in the dilemma of managing without a plan for so long that current users believe that what they are seeing and experiencing is what was intended in the 1972 legislation. This case history identifies some of the impediments to the planning process, outlining an “iron triangle” type of policy situation that has slowed the wilderness planning process.

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The Adirondack Park is forever wild and forever filled with controversy as interest groups from all sides maneuver to achieve individual agendas. It has all the components of classic environmental debates, like Hetch-Hetchy in Yosemite National Park, or the spotted owl issues of the Northwestern United States. At question is the fate of a nonrenewable resource amidst stakeholders vying to maximize individual utility. An examination of the evolution and management of the High Peaks Wilderness Area is just such a case. Twenty-five years of planning has yielded only a proposed final draft of a High Peaks Wilderness Complex Unit Management Plan.

This paper outlines the implementation of the wilderness planning process in the High Peaks Wilderness Area of the Adirondack Park in New York State. It will give a brief historical background of the High Peaks Wilderness Area planning process from 1972 until the present and then show why the process from allocation to planning and management has not been completed.

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## Case Background

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The High Peaks Wilderness Area covers 226,435 acres or 354 square miles (91,798 ha) in the center of the 6 million acre Adirondack Park in northern New York State. This Wilderness Area receives over 130,000 visitors annually, far exceeding the visitation rates experienced at other wilderness areas in the Adirondack Park (NYSDEC 1996).

Within the High Peaks Wilderness Area is Mt. Marcy, the State's highest peak at 5,344 ft. The eastern portion of the Wilderness Area receives the majority of recreation use, while the western portion receives substantially less (NYSDEC 1996). It is the largest of 16 Adirondack Park Wilderness Areas.

## Historical Overview

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In 1972, the State of New York legally designated over one million acres of the Adirondack Park as Wilderness. The Adirondack Park State Land Master Plan (APSLMP) was included in the Adirondack Park Agency Act. It was designed to provide comprehensive guidelines for management and use of the State's wildlands. In compliance with the mandate, the New York State Department of Environmental Conservation (NYSDEC) was directed to develop Unit Management Plans (UMPs) for each wilderness area designated. The Unit Management Plans would, by law, conform to the APSLMP but would be specific to each area of designation. The courts have ruled that the APSLMP has the force of law. The Unit Management Plans are mandated to incorporate APSLMP guidelines and objectives into planning for each designated area (NYSDEC 1996). Plans are required to span a 5-year timeframe to reflect changing ecological or sociological conditions.

The APSLMP uses a definition of wilderness that closely parallels the United States Congressional definition used in the 1964 Wilderness Act. The major difference is that the APSLMP substitutes “forest preserve” for “federal land” and increases the minimum size requirements from 5,000 acres to 10,000 acres (NYSDEC 1996).

The Unit Management Plans have several objectives. The two that are considered the most important are involving and introducing the public to the planning process to promote a sense of pride and ownership, ensuring that an increasing population does not occupy and modify all natural areas within New York State (NYSDEC 1996).

The proposed 1996 High Peaks Unit Management Plan states:

Without a UMP, Wilderness area management can easily become a series of uncoordinated reactions to immediate problems. When this happens, unplanned management actions often cause a shift in focus that is inconsistent and often in conflict with wilderness preservation goals and objectives. A prime objective of Wilderness planning is to use environmental and social science to replace nostalgia and politics. Comprehensive planning allows for the exchange of ideas and information before actions, that can have long term effects, are taken. A written plan stabilizes management despite changes in personnel or the influences of multiple administrative units where several managers and/or disciplines have different perceptions on how wilderness should be managed. In view of tight budgets and competition for monetary resources, plans that clearly identify management objectives and actions have demonstrated greater potential for securing needed funding.

In spite of this statement, the implementation of the High Peaks Unit Management Plan is still pending. As of 1993, six of the 16 designated wilderness area Unit Management Plans were completed or near completion (Dawson and others 1994). Despite two completion date extensions, New York State has developed unit plans for under 38 percent of its Adirondack Park Wilderness Areas.

## Unit Management Planning Impediments

James Dawson (1990) outlined some early impediments to the Unit Management Plan process in the Adirondack Park: (1) lack of full-time staff to complete the UMP's, (2) insufficient NYSDEC priority for plan completion, (3) a wide variety of responsibilities competing for NYSDEC's limited resources, (4) disincentives to complete plans, especially the increased management flexibility afforded by the absence of plans, (5) lack of NYSDEC resources in the Division of Fish and Wildlife to prepare sections of the UMPs, and (6) differences between the Adirondack Park Agency and the NYSDEC in interpreting the State Land Master Plan. In the High Peaks Wilderness Area, many of these impediments still hold true. However, the situation in the High Peaks is even more complex and urgent; as the funds allocated to resource management continue to fall, the popularity and numbers of users in the High Peaks continue to grow (table 1).

## The High Peaks Unit Management Plan

To be in compliance with the APSLMP, the State was mandated to develop a management plan specifically for the High Peaks Wilderness Area within 5 years of the 1972 designation. By 1974, the High Peaks Wilderness Area was growing in popularity and use, while the average number of years of hiking experience by users decreased (NYSDEC 1978). The NYSDEC responded to this situation by developing "The High Peaks Advisory Committee." Under the chairmanship of a NYSDEC representative, the

**Table 1**—High Peaks trailhead registrations from 1983 to 1995 (NYSDEC 1996).

Year	Number of visitors
1995	131,110
1994	123,092
1993	114,067
1992	109,412
1991	100,751
1990	93,233
1989	89,647
1988	83,983
1987	84,774
1986	78,779
1985	67,354
1984	63,405
1983	57,016

group was asked to investigate and develop possible solutions to growing resource impacts. The report, finalized in February 1977, found that High Peaks planning and management had been constantly under financed and that there were high amounts of trail erosion and alpine deterioration due to soil types, water erosion, and human use (NYSDEC 1978). The report's findings and recommendations helped shape the first proposed High Peaks Unit Management Plan in 1978; however, it was never implemented.

In 1985, the NYSDEC distributed another draft of the High Peaks Plan but later withdrew the document (Ringlee 1994). A Citizens Advisory Committee was re-established in 1992 and released their findings in 1994. In 1996, the Final Draft of the High Peaks Plan was released, restating several of the issues and management actions outlined 18 years earlier (table 2).

Nearly 20 years after the first proposed High Peaks Unit Management Plan, the latest plan, seeking to accomplish many similar objectives, has yet to be adopted and implemented. The governing agency clearly sees the need to implement a management strategy, but at the same time, all of the parties involved cannot seem to come to a consensus. Issues transcend internal bureaucratic incrementalism and involve external parties, including NYSDEC, non-government organizations, town councils, the public, and the New York State Legislature. No party involved seeks the demise of the High Peaks Wilderness; each just wants it managed from their vantage point. As growing interest in recreation threatens to degrade our wild resources, we struggle with a major paradox for wilderness. How do you manage for pristine or natural conditions and still allow 130,000 visitors to experience such naturalness?

## The High Peaks Wilderness Area Iron Triangle

In an analysis of the interactions among the USDA Forest Service, committees of the U.S. Senate and House of Representatives, and the public, LeMaster (1984) described an "iron triangle" in which adversarial relationships between public agencies, private interest groups, and the public interlock to hinder action.

**Table 2**—A comparison of selected management actions in the proposed High Peaks Unit Management Plans: 1978 and 1996.

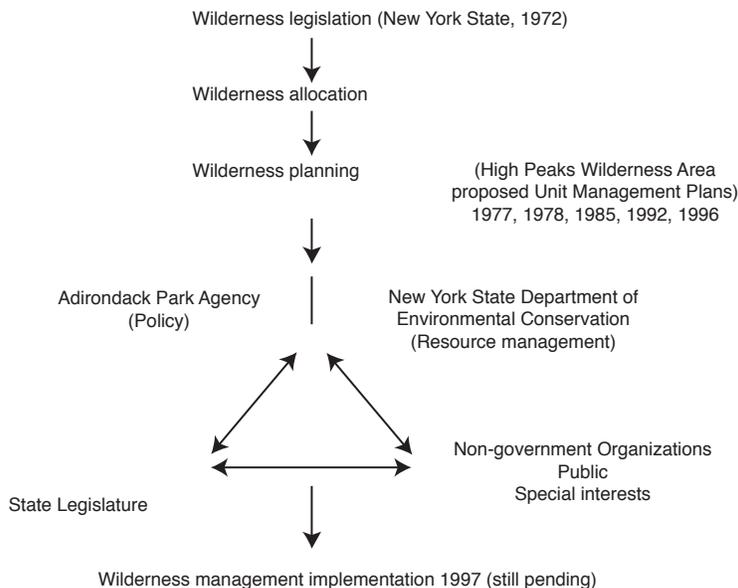
Selected management actions	Proposed High Peaks Unit Management Plan	
	1978	1996
Group size restriction	Must obtain a permit for groups greater than 10 people.	Overnight group size limit at 12. Day-use group size is 15. Large groups from each division must be split into “self-sustaining” groups and not congregate into larger groups.
Carrying capacity of designated camping areas and lean-tos	The overnight carrying capacity estimated at 1,200 people in designated campsites and lean-to’s.	Carrying capacity is addressed from a theoretical standpoint, but no quantitative estimates are given.
Telephone lines	Considered nonconforming to the APSLMP. Proposed to be removed as soon as possible.	Considered nonconforming to the APSLMP. Proposed to be removed.
Bridges	Replace bridge entirely if damaged beyond repair.	Reduce the number of interior bridges to the minimum necessary.

Within the High Peaks Wilderness Area, many of these relationships can be found. However, the situation in the Adirondacks is more complicated than the “iron triangle” described by LeMaster. In the High Peaks Wilderness Area, conflict occurs between the NYSDEC, non-government organizations, the public, and the New York State Legislature. This conflict is complicated by the fact that several of the non-government organizations and the two State agencies involved (the Adirondack Park Agency and NYSDEC) have separate agendas. The complex and intertwined relationships in the High Peaks “iron triangle” highlight the philosophical differences that each party has in interpreting the APSLMP, and the problem of managing today’s wilderness users while preserving our wildlands for future generations (fig. 1).

### The Adirondack Park Agency

Overseeing the policy planning process is the Adirondack Park Agency. Their job is clearly stated in Section 801 of the Adirondack Park Agency Act: “to insure that contemporary and projected future pressures on the park resources are provided for within a land use control framework which recognizes not only matters of local concern but also those of regional and state concern.”

All Unit Management Plans and policy must be approved by the Adirondack Park Agency. The decisionmaking power at the Agency rests not with the executive director and his or her staff, but with the commissioners appointed by the governor. In the last 25 years, political changes in elected and appointed state officials have affected this



**Figure 1**—The “Iron Triangle” policy situation of the High Peaks Wilderness Area.

agency and resulted in little consistency, making passage of the High Peaks Unit Management Plan that much more arduous. This situation, combined with State cuts in budget and personnel, have further slowed this bureaucratic process.

## **The New York State Department of Environmental Conservation**

Writing the Unit Management Plans and managing the resource is the responsibility of the New York State Department of Environmental Conservation. The Department has the task of managing a park with limited funds, while wilderness users have unlimited access to the trails. The Department must also contend with its own agency image and public perception. If public satisfaction with the Department is low, the New York State Legislature has less incentive to maintain or increase their fiscal budget. The Department must also work closely with interest groups like the Adirondack Mountain Club who manage a major access point to the High Peaks Wilderness Area. In 1995, 35 percent of High Peaks users chose the Adirondack Loj as their entry point (NYSDEC 1996). The Adirondack Loj is a facility owned and managed by the Club. The Department shares some responsibility in management of the High Peaks Area with the Adirondack Mountain Club because of the Club's management of this major access point and volunteer work of Club trail maintenance crews.

## **The New York State Legislature**

Agency funds are controlled by the New York State Legislature which has been allocating less money to the New York Department of Environmental Conservation and the Adirondack Park Agency each year. State legislators interested in re-election respond to constituents, who are represented as voters and lobbyists from many special interest groups and non-government organizations. These New York State constituents make up over half of the High Peaks Wilderness users (NYSDEC 1996).

## **The Non-government Organizations, the Public, and Special Interests**

Some non-government organizations supply concessions and services to the recreationists. In doing so, certain of these organizations have an interest in controlling access to the High Peaks and in providing trail maintenance and interpretive services at a low cost to the New York State Department of Environmental Conservation and to the public. The Adirondack Mountain Club is a good example of a group who has the power to influence the wilderness planning process. The Club has over 23,000 members, around 90 percent of which are New York State residents (Freeman 1997). This constituency base gives them leverage in setting its agenda. According to Ringlee (1994), the Club is concerned with the "strong reliance on additional rules and limits" set by the Department in the High Peaks

Wilderness Area. Several other non-government organizations represent recreationists in the High Peaks Wilderness Area including: The 46'ers, The Association for the Protection of the Adirondacks, and The Adirondack League. Each group represents a different interest, increasing the number of agendas that must be considered during the public input phase of the planning process.

## **Effects on the Resource**

In the meantime, delays can lead to resource degradation. For example, implicit in the federal 1964 Wilderness Act is the expectation that lands recommended for wilderness status would not be degraded prior to Congressional decision on wilderness designation or release (Crumbo 1994). The National Park Service takes this one step further under its Management Policies (1988), requiring lands recommended by the agency as wilderness to be managed as such until Congressional decision. The High Peaks Wilderness Area of New York State has fallen short of this ideal. Although the area is treated as a State-designated wilderness, 25 years of interim management has not protected the resource as originally intended. Carrying capacity analyses as well as several uses and facilities are still not in conformance as outlined in the policies of the Adirondack Park State Land Master Plan in 1972.

Policy is the authoritative allocation of values for all of society (Easton 1965). In this way, wilderness policy is educational, and wilderness management sets a precedent for "pristine" or other values set in the manager's objectives. This can be seen in the changing values we have witnessed since the passage of the federal 1964 Wilderness Act. For example, Watson and Landres (in press) reported that 64 percent of surveyed wilderness users in Oregon believed that they should be able to camp wherever they pleased just 1 year after passage of the 1964 Act. In 1993, that proportion had changed to 22 percent. These attitudinal and behavioral changes may develop much slower when management objectives are postponed or waived.

The condition of the High Peaks Wilderness Area has the power to shape wilderness expectations and values of wilderness users, and herein lies the dilemma. In the 25 years of non-implementation, user norms have developed. Dawson (1994) suggests that this has led to problems in management as users' perceptions have been molded by a "wilderness" setting different from "wilderness" defined in the Adirondack Master Plan. Wilderness is the highest preservation classification that the New York State system confers to land. Wilderness areas are designated to uphold a preservation-oriented ethic in land use and management. In 25 years of interim management, we may have settled for less than that, impacting this preservation ethic and the High Peaks Wilderness Area resource.

## **Conclusions**

Each group involved in the High Peaks planning process "iron triangle" is a stakeholder because each one is affected by the decisionmaking process, and each has the power to

affect the outcome of the planning process. Because each group has shown little interest in compromise, this 25 year planning process has not been completed in the High Peaks Area.

This situation is not an anomaly in wilderness planning processes across the country. In the Adirondacks, approximately 62 percent of wilderness areas lack completed Unit Management Plans (Dawson and others 1994). Likewise, across the United States, roughly the same percentage of federally designated wilderness areas lack implemented Unit Management Plans (Reed and others 1989).

In Voyageurs National Park in Minnesota, a situation very similar to that of High Peaks is in progress. The battle in this Park began several years ago and involves 12 groups, all concerned with the extent of motorized recreational access allowed in the park. Through mediated dispute resolution, 10 of 12 members supported a compromise that offered first-time stability to the area (Schott Hunt 1997). The Plan needs full consensus to pass and efforts are underway to reach a final compromise. This effort should offer a model for the dilemma in the High Peaks Wilderness Area. Although consensus has not yet been reached in Voyageurs National Park, these ongoing mediation efforts can bring them closer to resolution.

Interim management of High Peaks in the last decade is bringing the wilderness closer to the objectives set in the 1972 Adirondack Park State Land Master Plan. However, the conditions still fall short of the objectives, causing users' perceptions of wilderness to be different than the conditions outlined in the APSLMP. In 1997, the New York State Department of Environmental Conservation Wilderness Forest Ranger for the High Peaks Wilderness Area said, "Without a Unit Management Plan, we can't protect the environment from the people and the people from the environment" (Fish 1997). Passage of the Plan may stabilize funding and support management efforts that are consistent and suitable for wilderness areas, meeting the original objectives of the Adirondack Master Plan.

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# Wilderness Management and Restoration in High Use Areas of Olympic National Park, Washington, U.S.A.

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**Abstract**—The attraction of Olympic National Park's natural diversity and wilderness integrity along with its proximity to the heavily populated greater Seattle metropolitan have made it one of the most visited wilderness areas in the United States. More traditional management actions such as education, monitoring, visitor use limits, designated sites, and campfire restrictions have been implemented along with an intensive wilderness revegetation and rehabilitation program to address unacceptable impacts to wilderness resources and character that have resulted from high use. This combination of actions has proven extremely successful in restoring and preserving Olympic's wilderness qualities.

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Olympic National Park, both a World Heritage Site and a Biosphere Reserve, is an exceptional international treasure of natural diversity and wilderness integrity. Its 914,818 acres (370,227 ha) contain mountainous peaks draped with over 250 glaciers, remote subalpine meadows and lakes, some of the last remaining old growth temperate rainforest in the world, and a stretch of wild Pacific Ocean coastline. The Park's wilderness values are recognized as one of its greatest assets:

Olympic's wilderness values are superlative. As our technology races ahead, our need for the special peace and renewal of the human spirit that undeveloped, unspoiled wild lands can offer us increases proportionately. Thus, Olympic's rich, unique wilderness qualities emerge as among the most precious of the Park's resources. (Olympic National Park Master Plan, October 1976)

In 1988, 50 years after Park designation, the United States Congress designated 95 percent of the Park (876,669 acres) as the "Olympic Wilderness," to be managed under the Wilderness Act of 1964. This additional layer of law directs that the area will be administered in a manner that will preserve its wilderness character for its present and future use and for enjoyment as wilderness.

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## Impacts to Olympic Wilderness Qualities

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Olympic's wild character has drawn a multitude of visitors over the past 25 years. Overnight use in the Park's backcountry increased in the 1970's, then after a decline in the 1980's reached all-time highs in the 1990's for 5 successive years. In 1995, overnight backcountry visitation was 20,000 parties, 55,000 visitors, and 124,000 visitor use nights (visitor use nights = the total of the number of nights all visitors stay). The highest proportion of use occurs during July and August (49 percent), with rainy weather and snow conditions discouraging hiking in the off-season on all but the wilderness coast and lowland trails.

In general, use trends in the Olympic Wilderness are a result of its proximity to the greater Puget Sound metropolitan that extends from Bellingham near the Canadian border, through Seattle and Tacoma, to Olympia, the State's capital. About 57 percent of Olympic's overnight wilderness use originates from this area, 76 percent from all of western Washington. The recent rise in use is probably attributable to the increasing growth in the Puget Sound area population, which has grown by 500,000 in the past 10 years to 2.7 million people. Proportionately, Friday and Saturday nights receive the greatest overnight stays (40 percent), when most Puget Sound residents take their work weekends.

Olympic National Park has approximately 600 miles of trails to facilitate access within the wilderness, and over 1,300 established campsites are located along this maintained trail system. The vast majority of visitors (98.3 percent) remain within the maintained trail corridor, with the highest use concentrated in those river valleys with the most dramatic scenery, subalpine lake basins, and the most easily reached camp areas along the wilderness coast. Large groups, usually organized scout, church, or youth groups, tend to visit the already popular locations.

Concentrated use can have significant effects on wilderness character by compromising the aesthetics of the natural environment and by damaging resources and altering ecosystem processes. The cumulative impacts from the high use of the 1970's and the increasing use in the 1990's have resulted in unacceptable changes that run counter to the Wilderness Act. Those of greatest concern in the Olympic Wilderness are campfire-related impacts and trail and campsite deterioration. By first understanding the nature and cause of the impacts, effective management actions can then be determined.

## Campfire Impacts

In many high-use areas in Olympic National Park, campfires have resulted in a variety of unacceptable impacts.

Changes in soil chemistry as a result of fires alter species composition, though in bare-ground campsite areas this has usually not been a concern. The more difficult impacts to address have occurred as a result of firewood gathering. The search for firewood has caused soil compaction and vegetative impacts. The removal of dead and down wood is of special concern in areas where soil has been lost and soil replenishment cannot or is slow to occur, such as areas at or above timberline. In some camp areas where collection has exhausted the firewood supply, live trees and shrubs have been taken, resulting in impacts on the plant community and wilderness aesthetics.

## Trail and Campsite Deterioration

The most obvious visitor-related impact within the wilderness has been vegetation and soil loss through facility development and use. Most of the maintained trail system was constructed in the 1920's and 1930's. Though enabling access for enjoyment and use, trail construction resulted in hundreds of miles of vegetation loss. The ongoing impacts that occur on trails, such as soil erosion, trail widening and braiding, are often overlooked when wilderness impacts are considered, but cumulatively they can result in significant soil and vegetation loss. Water flowing down trails, for example, can carry off tremendous amounts of soil, carving deeply eroded trenches.

Hikers tend to use the more easily traversed trail shoulders when the main trail tread becomes difficult to travel. This can happen for a variety of reasons. It is not uncommon for lingering snow to obscure trail segments, although the adjacent vegetated ground has melted off. Frequent water flow on Olympic trails results in erosion of the fine materials, leaving behind larger cobbles that make hiking more difficult. Unstable banks upslope of the trail may be undercut by active erosion creating hills of soil in the trail tread. In some areas, especially in the rainforest valleys, water is not able to run off the trail thus creating muddy stretches. Hiking on trail edges to avoid these obstacles has doubled and even tripled the trail width in some places, or created parallel trails. A 2 ft widening of segments along a major trail can easily result in thousands of square feet of unacceptable bare ground.

With the exception of the maintained trail system, historical use patterns, rather than management decisions, have directed the location and number of the majority of existing facilities within Olympic. Social trails (trails accessing water, view points, campsites) usually developed directly from repeated visitor travel across vegetated areas. This has most commonly occurred in campsite areas where a network has formed as visitors seek their own routes from camp areas to other points of interest or need. It is more common than not to find numerous trails between two locations where one would serve.

The majority of campsites in Olympic also developed from visitor use rather than through management planning, which has resulted in a proliferation of marginal and oversized sites. Visitors usually select flat, attractive spots, often immediately adjacent to lakes or rivers, that do not protect soils, vegetation, water quality, or the experience of other visitors. In most of these campsites, soil erosion has resulted in the loss of fine soils and in the exposure of tree

roots, making sites uneven and uncampable. Poor drainage due to soil compaction and soil type results in wet, uninviting sites. Visitors seeking flat, campable ground migrate to the vegetated edges of sites which, in turn, results in campsite expansion.

## Management Actions to Restore Olympic Wilderness Qualities

The restoration of wilderness resources and the visitor's wilderness experience is critical in ensuring that the direction provided by Congress through the Wilderness Act is adhered to in managing the Olympic Wilderness. A combination of management actions has been adopted and has proven tremendously successful in addressing Olympic's wilderness impacts. The more conventional actions, such as education, monitoring, visitor use limits, designated sites, and campfire restrictions, instituted in many protected areas are being implemented in Olympic. In addition, an intensive wilderness revegetation and rehabilitation program has been developed that has enabled wilderness resources and character to be restored and maintained at acceptable levels, even within high-use areas.

### Education

Education is unquestionably the most important management strategy for ensuring both the short-term and long-term protection of wilderness. The successful prevention of deterioration and compromise of wilderness resources and character is incumbent on visitors' understanding and adopting wilderness values, ethics, and Leave-No-Trace techniques. To achieve this objective at Olympic, wilderness education is directed to hikers both during and prior to their visit.

Educational opportunities have been enhanced by expanding the number of visitors contacted before they enter the wilderness. A Wilderness Information Center (WIC) has been created adjacent to the Park's main visitor center, providing a centralized location for wilderness inquiries. Volunteer and paid staff provide trip planning information, updated trail conditions, safety tips, and minimum impact suggestions, both over the counter and by phone. Key resource concerns are described to the visitor, dependent on their hiking destination. Funding for the WIC comes from wilderness fees.

A Wilderness Trip Planner brochure has been developed to provide background material for visit preparation. The leaflet highlights information that will increase visitor safety and reduce wilderness impacts.

Onsite education has been extremely successful in preventing wilderness degradation. Coverage of high-use areas ensures that the majority of visitors receive a wilderness protection message. Limited funding does not allow paid personnel to staff all such areas, so volunteers trained through the Park's wilderness training program supplement the coverage.

### Monitoring

In order to prevent further impacts and restore wilderness conditions, a systematized program to assess those

conditions is necessary. Long-term ecological monitoring (LTEM) is being established in Olympic National Park to monitor the condition of key natural resources. Objectives include understanding how components of Olympic's ecosystems change over time, providing an early warning of human-caused changes that may require management intervention, and providing a benchmark for assessing the health of more altered landscapes.

In addition, Olympic National Park has developed an ongoing monitoring program that is specifically directed at detecting and measuring the impacts on wilderness resources and character from visitor use. Campsite-related impacts, such as the amount of bare ground, organic soil, root exposure, and mutilated trees, are determined and compared to Olympic's wilderness standards. Campsites are mapped and photographed to more effectively relocate them and recognize changes over time. Visitor use levels are determined through daily logs kept by ranger staff documenting visitor numbers and individual site use. The use and resource impact data are used to determine appropriate management actions and to prioritize sites for restoration activities.

## Visitor Use Limits

The most attractive of Olympic Wilderness sites accessed by trail have often been deluged with visitors. Even with other management actions in place, resources and the wilderness experience will continue to be affected unless visitor use levels are lowered. Thus far, use restrictions have focused on overnight rather than day visitors. Throughout the Park, overnight party size is limited to 12 visitors and, in those areas where stock are allowed, eight horses, mules, or llamas.

In some National Park Service wilderness areas, overnight quotas have been put into effect for all zones, limiting visitor use camping numbers throughout the wilderness. At Olympic, only specific areas identified as receiving too much use (based on wilderness plan guidelines) have overnight quotas. For example, one lake basin containing nine sites is restricted to 30 people per night, but the sites along the 8 mile trail accessing the area are not within the quota zone. Olympic's determination of actual quota numbers is based on the capacity of the area to sustain use while maintaining established wilderness conditions. Often, they are developed from the number of campsites that are deemed appropriate to keep within the area. Reservations for the quota areas may be made 30 days in advance for up to half the quota number. This allows visitors that plan ahead the assurance of receiving a site, but still provides an opportunity for visitors arriving at the Park without reservations to have some chance to camp in the most popular locales. Requiring more than 30 day advance reservations results in visitors making plans they are less likely to keep.

## Designated Sites

Though Olympic's campsites developed and proliferated through visitor use rather than management selection, sites are now being reexamined to determine if each meets wilderness standards. Sites are evaluated based on distance

from the main trail, other sites, water, and the likelihood that the site will not expand through vegetation loss and soil erosion. Unacceptable sites are closed, and those that meet guidelines are designated for use. Visitors are required to use designated sites along the trail corridor. This controls the development of new sites and helps make possible the restoration of closed areas. In the low-use cross-country zones, visitors are asked to camp on snow, rock, or resilient vegetation and to avoid camping on sites showing previous impacts where repetitive use would damage vegetation and potentially cause new site development.

## Campfire Restrictions

In the 1970's, it was determined that campfire impacts to subalpine areas of the wilderness were too great to allow the building of open fires. "Stoves only" zones were established above the montane plant community in elevations with few or no trees. This more than 25 year closure has resulted in a significant decline in visitor-related impacts in subalpine areas. Probably the most popular backpacking destination in Washington State is located along Olympic National Park's wilderness coast. Though located at sea level, within the forest, with large piles of driftwood available and a use quota in place, it was determined that the campfire-related impacts were too severe. The area was closed to open fires in 1997, which has resulted in less trampling, soil compaction, and vegetation loss. In turn, this has protected revegetation efforts carried out in this area. Efficient and lightweight backpacking stoves have enabled most visitors to adapt to this change, but those still desiring the opportunity to build campfires can hike to alternative locations.

## Rehabilitation and Revegetation

Site and trail rehabilitation and revegetation have proven to be one of the most successful methods for restoring high-use sites in the Olympic Wilderness. The combination of site upgrade and revegetation with the more conventional management actions discussed previously has been highly effective in maintaining restored wilderness conditions as well. The objectives of the rehabilitation and revegetation program are to upgrade facilities selected for retention to encourage visitor use and limit the area of visitor impact, and to restore the original native plant community as closely as possible on denuded sites and trails targeted for closure.

Olympic's revegetation program begins with the development of a detailed plan for the area based on monitoring data. An area map is drawn locating main trails, social trails, all sites, and other existing facilities such as toilets, bear cables (to hang food in trees away from bears), and ranger stations. Each trail and site is measured for length or area and given a code number. A determination is made of which trails and campsites will be retained for use and which will be closed to allow restoration. A specific prescription is then developed for each.

Campsites and trails are selected for retention based on use needs and whether wilderness values can be restored elsewhere by keeping them. Those remaining open are upgraded in a way that encourages visitors to contain their activities within trail and site boundaries.

Along main corridors where trails have widened or become braided, rocks and branches are placed on the trail shoulders to keep visitors on the main trail tread. If damage is severe enough, revegetation is done prior to placement. In some cases, where lingering snow has obscured the main trail and a parallel trail has developed in the early melt-off area, a more effective solution has sometimes been to upgrade the newly formed parallel trail and block and revegetate the former main trail. On trails where erosion has resulted in the loss of fine materials, rock or wood check dams are constructed to slow water flow and erosion and even allow soil buildup. Where check dams have been constructed along widened sections, large rocks placed on both sides of the check dam channel use. In time, vegetation begins to grow around the rocks, reducing the width of impacted tread. In substantially widened trail sections where bank undercutting has occurred, the construction of "planter boxes" has proved to be an effective rehabilitation technique. A rock wall is constructed, backfilled with rock and soil, and planted with vegetation. Bank erosion is halted and the trail restored to within standard. Sloping trails with flowing water can usually be improved by diverting water away using water bars (wood or rock used to form a ditch to carry water). Muddy, flat trails widened by visitors avoiding wet sections may be upgraded by placement of short wooden bridges called puncheon. Construction of turnpikes, using gravel from dry creek beds or uprooted trees that are placed between rock or wood borders, is also effective in bringing trail width back to standard.

Logs, and sometimes rocks, are used to delineate campsite borders, making site boundaries more clear, thus reducing campsite expansion. In areas where subtle delineation is not effective, very large barrier logs are pulled into place using hand-powered come-alongs. This discourages travel and camping in the site's closed perimeters. Sites are backfilled with soil or gravel to enhance drainage and campability, diminishing campsite sprawl. Rocks are placed within the site to be used for propping packs or as cooking or sitting surfaces to discourage travel into vegetated areas as hikers seek such amenities, reducing social trail development.

Logs are also strategically placed in sites and trails identified for closure. This creates barriers to discourage access. Rocks are dug in like "icebergs" in the center of closed areas that backpackers might otherwise find attractive for setting their tents. Dead wood is buried vertically to create the illusion of snags for the same purpose. Reducing traffic ensures a greater chance for plant recovery.

In many areas targeted for closure, natural recovery may successfully occur if vegetation has not been damaged too seriously and trampling is minimized. The majority of closed sites and trails in high-use areas have suffered significant enough damage; however, that recovery may take long periods and visitors will continue to be attracted to use the sites, making restoration impossible. Subalpine areas are especially slow to recover. Olympic's dominant subalpine species tend to be the woody shrubs such as heather and huckleberry that break easily, resulting in vegetation loss after moderate trampling. The growing season is extremely short in the high country with only a few summer months available for regrowth. Soils lost through erosion are not replenished since little duff or litter accumulates at or above treeline. Active revegetation is often required in high-use areas, especially the high country, to ensure that restoration occurs.

Revegetation efforts begin with the gathering of seeds and cuttings. Source materials are collected onsite in order to protect the plant community's genetic integrity. Species are targeted that will restore the original species composition as closely as possible. The plants are propagated in the Park greenhouse using a misting bench with bottom heat and specifically formulated rooting soil mixtures. Transplanting, ongoing watering, and feeding with fish fertilizer nurtures growth. Paperwork is done to track all plant treatments. Annually about 20,000 to 30,000 plants are propagated for Olympic Wilderness restoration projects.

Areas targeted for revegetation are prepared by thoroughly scarifying or breaking up compacted soil. Additives such as peat moss may be mixed in with the remaining onsite soils to help enhance plant growth in areas where soil has been lost to erosion.

Plants are packaged in cardboard boxes and transported to the project locations. The quantity of plants to be ferried onsite requires the use of motorized equipment. Helicopters are used in the high country, and for coastal projects sea transport is provided by the United States Coast Guard or the adjoining National Marine Sanctuary. The transplants are planted into the prepared beds, usually in the fall prior to plant dormancy. Watering, often the key to survival, occurs immediately after planting and then regularly until the fall rainy season arrives. Excelsior, aspen shavings that come in rolls, is placed over the revegetation areas to moderate the soil microclimate, protecting the plants from extremes in temperature. The material also serves as a mulch, enhancing the soil condition, and on steep slopes is used to check soil erosion. Plant survival has been extremely high.

Signs are placed to mark the specific areas closed for revegetation. A resource management sign is placed at the trailhead to explain the revegetation project and to identify with a map the campsites and trails that are open for use.

Little National Park Service money has been available for restoration work. Volunteers have provided a substantial amount of labor. In 1997, over 100 volunteers donated 4,000 hours of work to Olympic's wilderness restoration program. The majority of volunteers were recruited from the Puget Sound area, but a number of them came from throughout the United States to contribute to the project. Some volunteers worked for a day or two, others full-time for 5 months. Their contribution has ensured that the restoration program has been an extremely productive and cost-effective management tool.

## Future Preservation of the Olympic Wilderness

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The rainforests, glacier-covered peaks, and rugged coastline of Olympic National Park's exceptional wilderness is likely to attract increasing numbers of visitors in the future. Management actions such as education, monitoring, area use quotas, designated sites, and campfire restrictions have been highly successful in restoring and preserving wilderness qualities in high-use areas, when coupled with an aggressive rehabilitation and revegetation program. Continuing this management approach should ensure that the integrity of the Olympic Wilderness will be preserved so that future generations have the opportunity to use and enjoy a remnant of wild, primeval America.

# Current Efforts to Improve Wilderness Management Within the United States National Park Service

Jim Walters

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**Abstract**—While the United States National Park Service maintains the largest wilderness acreage inventory among the four Federal wilderness management agencies, it has not implemented an effective wilderness management program. The National Park Service intends to improve this record through management initiatives directed at its wilderness program accountability, consistency, and continuity.

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The 1964 Wilderness Act charged the U.S. National Park Service, the U.S. Forest Service, the U.S. Bureau of Land Management, and the U.S. Fish and Wildlife Service with responsibility for managing and preserving Federal lands included within the newly established National Wilderness Preservation System. Of the four agencies, the National Park Service maintains the largest wilderness inventory with 53 percent of its land administered as designated wilderness. The National Park Service administers 43,079,219 acres within 44 National Park units and has more than 16,000,000 acres recommended for potential wilderness designation in 31 additional park units.

The National Park Service was a reluctant supporter of the Wilderness Act based primarily on the belief that wilderness designation was “unnecessary” since National Parks were essentially being administered and protected as wilderness. The United States Congress disagreed with this assertion and pointedly included the National Park Service as one of the four agencies charged with preserving this resource in addition to responsibilities identified within the respective agency Organic Acts.

The National Park Service’s original reluctance to include itself under the auspices of the Wilderness Act has manifested itself in three basic problem areas in the ensuing 33 years since the Act’s implementation: accountability, consistency, and continuity.

## Accountability

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There is a current lack of accountability for the National Park Service’s wilderness program throughout the

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agency’s Washington headquarters office, the seven regional offices, and individual park units. Although the policy governing wilderness preservation and management in the National Park Service Management Policies Handbook has, since 1988, clearly stated that program accountability is to be established at each of the above administrative levels, the Service actually has very few personnel assigned to the management of this resource.

The National Park Service has one collateral duty wilderness position at its Washington office and one full-time wilderness position at one regional office. The remainder of the regions have either no dedicated wilderness position, or responsibilities are assigned as a collateral duty to various positions. There are currently only six “full-time” wilderness managers in dedicated positions within the 75 National Park units containing designated wilderness, and three of these six positions are also assigned law enforcement responsibilities.

Additionally, few superintendents have wilderness identified as a critical element in their annual performance appraisals, few position descriptions for key positions within National Parks that identify wilderness as a critical performance requirement, and few job announcements throughout the Park Service that identify wilderness management skills as a selection criterion for positions administering significant wilderness resources.

## Consistency

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The management of National Park Service wilderness resources varies radically from park to park and from region to region based largely on the lack of program accountability and the absence of a comprehensive planning strategy. Consequently, there is little consistency in the Service’s application of its policies addressing the use of only the “minimum requirement” (minimum tool) concept for administrative actions that are otherwise prohibited within wilderness. This has resulted in conflicting interpretations of how wilderness is to be managed. The net effect is that wilderness resources are ignored in some parks, while other parks attempt to apply both the letter and spirit of the Act in all management decisions.

Similarly, National Park Service policy has long required that all parks containing wilderness (in all categories including “designated,” “proposed,” “potential,” “recommended,” or “study areas”) must have a wilderness management plan that provides for the long- and short-term preservation of wilderness. After 33 years, only 14 parks have current (less than 15 years old) wilderness management plans, from the total of 75 parks containing wilderness resources.

## Continuity

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Emphasis on wilderness programs within National Parks is often based solely upon the attitudes and opinions of the current park superintendent or other key individuals who may or may not elect to champion this resource. When these individuals leave the park, for whatever reason, the emphasis on wilderness management is subject to the attitudes and opinions of their replacements. Sometimes the wilderness program improves; sometimes it doesn't.

## Efforts to Improve the National Park Service Wilderness Management Program

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The National Park Service has made attempts to address wilderness program shortfalls, including the convening of two separate task forces charged with developing a strategy for improving the Service's management of this resource. The first of these met in 1988 and resulted in a series of recommendations, including the establishment of key wilderness positions at critical administrative levels, the requirement for updated wilderness management plans, a comprehensive training strategy, and a program to fund these initiatives. No action was taken on any of these recommendations.

A second Wilderness Task Force convened in 1993. This group created the September 3, 1994, report entitled, "Wilderness Task Force—Report on Improving Wilderness Management in the National Park Service." This report expanded the recommendations of the 1988 group and included the creation of a "National Wilderness Steering Committee" whose mission would be to provide the National Park Service Directorate with specific advice on improving the Service's wilderness management program. As an initial step toward improving the Service's wilderness management program, funding was provided to establish this Steering Committee.

The 14-member National Wilderness Steering Committee convened for the first time in March 1996. Four primary initiatives were established to address issues of wilderness program accountability, consistency, and continuity and to implement the recommendations of the 1994 Wilderness Task Force report. These four initiatives include:

**1. Development of an education and constituency-building strategy such as "marketing" wilderness within Service ranks and the public.** Committee efforts to date have focused on in-Service initiatives to inform and educate National Park Service staff, including (a) establishment of a Wilderness Coordinator for each wilderness park, (b) establishment of an in-Service electronic wilderness "bulletin board," (c) creation of a National Park Service wilderness site on the world wide web, (d) creation of wilderness education scholarships for National Park Service staff wishing to participate in accredited university courses, and (e) establishment of a wilderness intern training program.

**2. Improving National Park Service wilderness management accountability.** On March 28, 1997, National

Park Service Director Roger Kennedy signed a memorandum drafted by the National Wilderness Steering Committee entitled, "Strengthening the National Park Service Wilderness Accountability System." This memo instructed regional directors and wilderness park superintendents to complete four specific actions addressing accountability. These actions included:

a. Add wilderness as one of five "critical results" elements in the superintendent's annual performance plan. Wilderness will subsequently be used as an evaluation criteria for the superintendent's annual performance appraisal.

b. Add wilderness as a "major duty" element in the position descriptions of all personnel having significant wilderness responsibilities and integrate wilderness into annual performance appraisals for these positions.

c. Identify wilderness as a basic qualification requirement for vacancy announcements for jobs with significant wilderness responsibilities.

d. Integrate wilderness into all pertinent Government Performance and Response Act (GPRA) Strategic Plans.

**3. Development of National Park Service wilderness guidelines.** The National Wilderness Steering Committee is currently in the process of finalizing wilderness guidelines that include the updating of National Park Service wilderness policies, the implementation of "minimum requirement" protocols, directions for the development of wilderness management plans, and specific guidance for other critical management issues affecting wilderness. These guidelines will be codified as primary management requirements through designation as Washington Office "Director's Orders" and publication in the "Federal Register."

**4. Development of a servicewide training initiative.** The National Park Service placed its first permanent representative at the Arthur Carhart National Wilderness Training Center in May 1996. This position also serves as liaison to the National Wilderness Steering Committee and regularly attends Steering Committee meetings.

Since the placement of this staff member, the Park Service has been an active participant in the formulation of the Center's training curriculum and subsequent recruitment of National Park Service personnel for wilderness training courses. Since the Center's establishment in 1993, the Park Service has sent 37 upper level managers to the "National Wilderness Management for Line Officers Training Course." In 1996 and 1997, the Center sponsored three Regional Line Officers courses, which were attended by 54 Park Service staff. An additional 14 staff members attended a separate Wilderness Planning Workshop.

The National Wilderness Steering Committee has also established a Wilderness Intern Program in coordination with the National Park Service Employee Intake Program, the Carhart Center, and the U.S Forest Service's Aldo Leopold Wilderness Research Institute. The Wilderness Intern Program is intended to provide wilderness training for National Park Service intake employees through formal course work and assignments to special training details.

The National Wilderness Steering Committee has additionally offered annual scholarships for staff members wishing to participate in the University of Montana's Wilderness

Management Distance Education Program. As of late 1997, 36 employees were enrolled in the program.

The National Wilderness Steering Committee additionally supports the servicewide "Leave No Trace" training program in cooperation with the National Outdoor Leadership School, Inc. As a result, the Park Service currently has 16 Master Level instructors available to instruct others in Leave No Trace techniques.

## Conclusions ---

It is the goal of the National Wilderness Steering Committee, not only to radically improve the wilderness management program of the National Park Service, but to challenge the other Federal land management agencies by establishing the National Park Service as the premier agency protecting the Nation's wilderness resource.

# Wilderness Boaters: Protecting Unique Opportunities in the Frank Church-River of No Return Wilderness, Idaho, U.S.A.

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**Abstract**—The focus of most wilderness visitor research is on areas of highest use concentration and greatest management presence. These are the areas where most problems seem to exist. Within the Frank Church-River of No Return Wilderness in central Idaho, there is a great diversity of land-based and water-oriented opportunities to experience nature, solitude, challenge, and spiritual excitement. Comparisons were made across samples of 301 private float visitors, 238 commercial float clients, and 174 peak flow tributary floaters on the Salmon River within the Wilderness. Management of these groups differ, and the groups themselves differ in many ways. Planners for this Wilderness must acknowledge these differences and must appropriately attempt to accommodate, through intentional management actions, the very different orientations to the rivers expressed by private float parties, commercial float parties, and the tributary floaters.

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In the United States, Forest Service managers around the country are heavily involved in Forest Plan revisions. Most wilderness plans did not originally incorporate all of the required components of the National Forest Management Act (NFMA) and, consequently, are being rewritten. This entails completing environmental analyses and when significant Federal actions are proposed, Environmental Impact Statements are required by the National Environmental Policy Act (NEPA). On National Forests that contain units of the National Wilderness Preservation System, wilderness issues are typically addressed in separate plans or amendments to the original Forest Plans. In most cases, leadership in obtaining public input to potential management changes has fallen to Forest planners, although wilderness resource specialists are also heavily involved.

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In a recent publication, Watson and Roggenbuck (in press) argued that the indicators selected for long-term monitoring of the effects of management actions may vary, depending on the approach used to select those indicators. The three primary approaches reviewed in that publication were: (1) working groups composed of representatives from local organized interests and agency personnel, (2) public response to proposed indicators developed by interdisciplinary agency planning teams, and (3) scientifically administered visitor surveys. The purpose of this report is to delve more deeply into the complexity and results of using visitor surveys as a basis for selecting human experience indicators for judging the effects of wilderness management decisions. Specifically, studies of commercially guided river rafters, private rafters, and tributary floaters in the Frank Church-River of No Return Wilderness were conducted to understand how the experiences that each group is seeking are reflected in management preferences, perceptions of problems, and the set of indicators being considered during Forest Plan revision for this Wilderness.

## Indicators

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An indicator is a specific parameter that can be monitored to determine whether management objectives are being met (Watson and Cole 1992). To be an indicator, a parameter must be stated in a specific enough manner to be monitored unambiguously. Management objectives are often initially stated in quite general terms. For example, many wilderness plans contain objectives related to visitor solitude. Solitude, however, is not commonly measured directly. The way management evaluates achievement of solitude objectives is through monitoring of specific indicators believed to provide feedback on forces that threaten solitude opportunities. Commonly used indicators for this factor include the number of encounters with other groups along a trail or while at an overnight campsite. It has been assumed that these are the most common threats to solitude during wilderness trips, although some question has been raised in recent years as to the validity of that assumption (Hollenhorst and others 1994). Watson and Cole (1992) concluded that as well as the difficulty managers encountered defining indicators in specific and quantitative terms, and in selecting indicators due to the lack of reliable monitoring methods,

managers struggled to select among known indicators because of a lack of understanding about which indicators are the most significant.

In this report, we used visitor surveys to determine the significance of potential indicators. For the most part, in past visitor studies, samples of seasonal visitor populations have been surveyed to gain insight into the importance visitors place on resource and social conditions under management control. Usually, visitors evaluate the importance of potential indicators that have been adopted at other places, or come from the individual researcher's knowledge of the wilderness literature. Sometimes potential indicators arise during pilot testing and discussion of issues with local managers and visitors. This limited source of items may strongly influence the conclusions drawn about indicator significance (Watson and Roggenbuck, in press). One other limitation has been that most studies have involved contact with visitors at the wilderness exit and subsequent mailing of a survey exploring the significance of potential indicators. Watson and Roggenbuck (in press) recommend immediate assessment of the influence of indicators on trip quality.

## Diversity in Wilderness Experiences

Historically, studies on solitude have dominated investigations into how the quality of a wilderness experience is determined. Lucas (1990, p. 471) suggested, "Generally, social conditions affect experiences more than the naturalness of conditions. Solitude, visitor conflict, and some visitor behavior are all elements of the social conditions related to (wilderness) experiences." Alternatively, Stankey and others (1990, p. 215) did not make a distinction between the importance of solitude and naturalness when they wrote, "Although many qualities are associated with wilderness, two of them, naturalness and solitude, are most frequently prescribed in popular literature and the law." These thought-leaders of the 1970's and 1980's certainly influenced the amount of emphasis placed on studying solitude and the domination of crowding in most applied Limits of Acceptable Change (LAC) (Stankey and others 1985) prescriptions for indicators.

More recently, emphasis has been on understanding and acknowledging the many "other" qualities associated with wilderness, thereby better understanding the relative importance of solitude or crowding to wilderness visitors. Watson and Roggenbuck (in press) found the dominant dimensions of wilderness experiences at Juniper Prairie Wilderness in Florida to be (1) interaction with nature, (2) challenge/primitive/wayfinding opportunities, (3) interaction with people, and (4) timelessness. Arnould and Price (1993) described wilderness visits generally as nonutilitarian and providing intense, positive, intrinsically enjoyable experiences. Solitude may contribute to achievement of many of these outcomes; therefore, the value of solitude might be in providing the means to a more personal end.

Ewert and Hollenhorst (1997) report that wilderness activities that purposefully include elements of risk or danger are on the increase. Adventure wilderness experiences are often associated with opportunities to exhibit traditional wilderness skills when confronted with an uncertainty of outcomes. While risk and uncertainty accompany many types of wilderness activities, they are

not necessary antecedents to experiencing wilderness (Ewert and Hollenhorst 1997). While adventure types of activities focus on dealing with risk and uncertainty, white-water rafters have been found to also value connectedness with nature and connectedness with others in the community of floaters; they view overcoming challenge as an opportunity for extension and renewal of self (Arnould and Price 1993).

Based on the study of indicator significance for identifiable subpopulations of river users in the Frank Church-River of No Return Wilderness, managers should gain understanding of the diversity of experiences sought by wilderness visitors. Greater understanding of this diversity should help formulate management prescriptions and select indicators, increasing awareness of the effects of revisions made to original wilderness plans.

## Methods

### Study Location

When the Middle Fork of the Salmon River was designated under the Wild and Scenic River Act of 1968 as a "Wild" river, its values as a free-flowing wilderness river were protected by Federal law. The attributes of a wild river were specified in three key sections of the Act. In Section 2b, a wild river is defined as the river and its adjacent land that is "...generally inaccessible except by trail, with watersheds or shorelines essentially primitive." In Section 10a, the USDA Forest Service is given the authority to administer the River in a manner that protects or enhances its wilderness characteristics, including limiting nonconforming uses and developing a protective management plan. In Section 10b, Congress specified that, should a conflict arise between the Wilderness Act and the Wild and Scenic River Act, the "more restrictive provisions would apply."

The Middle Fork of the Salmon River is floated by a combination of over 10,000 private and commercial boaters each year on a 90 mile stretch within the boundaries of the Frank Church-River of No Return Wilderness. The Middle Fork feeds into the Main Stem of the Salmon River outside wilderness boundaries, and then the Main Stem re-enters the wilderness for another 79 mile stretch. This portion of the Main Stem was included as a designated "wild" river in our Wild and Scenic River system in 1980. Approximately 6,500 people float the Main Stem inside the wilderness each year. Additionally, this 1.3 million acre wilderness has multiple floatable tributaries to these two wild rivers (the Middle Fork and the Main Stem), including Loon Creek, Big Creek, Marsh Creek, Camas Creek, and the South Fork of the Salmon River. These tributaries receive primarily peak-flow, private-float usage; only during spring runoff is there sufficient water to float them in kayaks and small rafts. Beyond the end of June there is seldom use of these tributaries for floating. There was no estimate of the amount of use they receive or any information about users, except the common assumption that they are highly skilled.

### Sampling

Two different sampling methods were used. For the Middle and Main Forks of the Salmon River, visitors were contacted at the location where they put their watercraft on the river

(Hunger 1996). During the primary-use season of 1995, 10 pairs of days were selected from all possible days between July 15 and September 16. This included 8 sampling days during the summer permit season and 2 sampling days in September, outside the summer permit season. No differentiation was made between weekdays or weekends because parties launch in equal numbers 7 days per week. On the Main Fork, the maximum number of permits per day is for eight groups, while only seven groups are allowed to launch each day on the Middle Fork.

On sampling days, each launch party was approached following the formal prelaunch orientation and before they boarded their boats. This was usually coordinated with the trip leader and the USDA Forest Service launch coordinator to alleviate confusion. Up to 10 people, ages 16 and older, from each group were randomly selected. In groups of 10 or less, all were surveyed. On the Middle Fork, this system generated 303 respondents. On the Main Stem it generated 240 respondents. Commercial guides were not included in the pool of potential respondents because they represent a different stratum of the population not included in this research.

The survey process involved obtaining information at various times during the trip. Respondents received a survey composed of five sections at the launch point. The launch-point section was completed in the presence of a survey administrator, who also answered questions about the methodology and remaining sections. The other four sections were completed in stages during the trip and deposited in specially marked mail boxes at easily identified locations to obtain a more immediate assessment of trip quality.

Survey sections were developed for launch point, first night, third night, and last night on the River, and the take-out point. Significance of potential indicators was explored in the "first night" section of the survey, and these responses were dropped in the first drop-box along the river (about 60 percent of the launch-point sample completed this section). On the third night, respondents were asked about their support or opposition to several potential management actions for minimizing recreation floater use impacts on the resource or the experiences of others (about 58 percent of the launch-point sample completed this section). On the last night on the River, visitors were asked about the things that may have contributed to their enjoyment of their river trip (about 50 percent of the launch-point sample completed this section). Analysis was based on a stratification of these river users into two groups: commercial and private. This analysis decision was based on the finding that the likelihood of response to all except the launch-point survey was significantly related to whether respondents were in private or commercial groups. This resulted in 238 commercial clients and 301 private party members.

The unique tributary floaters could not be sampled the same way. Due to a variety of factors, these boaters are not restricted to launching on a particular day at a particular place, although when the tributary they are floating reaches the confluence with either the Main Stem or the Middle Fork, boaters are expected to have a permit for floating that river for the days they are on it. Boaters sometimes drive to accessible launch points, and sometimes they charter small aircraft to ferry them and their gear to landing strips near

launch points on Loon Creek and Big Creek to gain access during the critical peak-flow period.

Contact with unique tributary floaters was made in three ways because of the effect unpredictable waterflow levels had on launch times and locations for this "independent" boating community. First, on randomly selected days, at randomly selected launch points during the spring boating season of 1996, a research assistant interviewed boaters at various launch sites. Success was very limited, as expected, but the contacts that were made offered general knowledge about this group of users. This was crucial in providing some familiarity with this group of floaters, as well as to obtain their names and addresses for a mail-out questionnaire.

The second method of contact was through installation of self-registration stations at each tributary launch point. Posted on this registration station was an appeal for responding and an explanation that Main Stem and Middle Fork boaters had been contacted for input into revision of the Forest Plan, and input was also needed from the tributary users. A substantial number of names and addresses were obtained through this manner, bringing the total number of launch-point contacts to about 50.

With a goal of 150 surveys, a third method used was to reach beyond only that year's users of these tributaries. Based on field sampling, it was determined that some of these tributaries are only floated by some people once in a lifetime and that a more appropriate population of users may be people who had floated any one of these tributaries at any point in their lives. Therefore, each mail-out survey that was sent out to people contacted through one of the launch-point methods contained a request to identify up to two people who they knew had floated one of these five tributaries before. They were assured confidence for this information; it would be used only as part of this study. As these people were then contacted, they were asked to identify others who had floated these tributaries. Avoiding repeat surveys to a single individual, the sample size increased to 216. While this is not a randomly selected group, respondents represent close to a census for the 1996 season (mechanical counters were mounted near the launch point and compliance was estimated at near 90 percent), and randomness was not a possibility for the population of past users.

Survey data was obtained from a mail-out questionnaire in this case, but the sampling methods precluded other approaches if consistency in questions was to be achieved across the samples. The survey was mailed to each person with an explanation of how that name and address was obtained. The questionnaire items closely followed the critical items described earlier from the primary river route surveys. A follow-up reminder card was sent out approximately 2 weeks after the initial mailing, and a full package follow-up was sent out about 4 weeks after the initial mailing to those who had not responded. A final response rate was calculated to be 81 percent ( $n = 174$ ).

## Survey Items

All users were asked about their past experience level on the primary river routes within the Wilderness. The tributary users were also asked about their past trips on the tributaries. Every user was asked to indicate personal level of skill in river travel on a scale of "beginner, novice, intermediate, advanced, expert."

Following methods employed by Watson and others (1992) and Williams and others (1992), significance of social and resource indicators was measured on a scale from mattering “not at all” to mattering “extremely” in defining the quality of a stream float trip at this place. The list of proposed indicators posed to all groups was developed primarily by an interdisciplinary team of resource management specialists, from issues identified in the public involvement process for the Frank Church-River of No Return Wilderness, with some additional items added by the science team investigating this issue.

Visitor support for proposed management actions that were being considered by the interdisciplinary planning team or that had been mentioned in the public involvement process was measured on a five-point scale, ranging from “strongly support” to “strongly oppose,” with both a neutral point on the scale for respondents who could not decide their level of support and a column labeled “no opinion” for those who either did not care or who had insufficient knowledge to judge their support.

A total of 30 potential outcomes, or contributors to enjoyment, of a river trip were evaluated using a four-point scale of “very much, moderate amount, slight amount, not at all.” This list of items comes principally from previous studies of the motivations of recreation users.

## Analysis

Comparisons for visitor support for management actions and trip outcomes were made across three groups: (1) commercial users from both segments of the Salmon River, (2) private party boaters from both segments of the Salmon River, and (3) tributary users, which were all private boater parties. Rankings of indicator significance were developed within each group.

To gain understanding of patterns of outcomes, responses to the 30 outcome items were entered into a factor analysis. A model was developed that would explain the maximum variance in the outcome items while reducing them to a smaller, intuitive set of factors. The model that was chosen used the Maximum Likelihood method of factor extraction. The resulting factors were rotated using Varimax Rotation to aid in interpretation by maximizing the difference between the factors. The 30 variables were all measured on the same scale, and all 30 variables individually had normal distributions as found by using the Kolmogorov-Smirnov

test for normality. Thus, assuming multivariate normality, no transformations were necessary prior to conducting the factor analysis.

After an initial run, the model was refined by removing the four variables with the lowest initial commonalities (all were less than 0.25). Examination of eigenvalues and the scree plot break point of the resulting model indicated that the appropriate number of underlying factors to efficiently represent the remaining 26 variables was five or six. Further examination of model results indicated the six-factor solution was more interpretable than the five-factor solution, with the former having fewer variables associated strongly with more than one factor. The total variance explained by this solution was 51 percent. The six rotated factors extracted from the pool of motivation items were labeled as River Challenge, Escape from Civilization, Social-Cultural, Physical and Emotional Health, Companionship, and Primitive Skills.

## Results

The three user groups differed significantly on past experience, supporting the premise that these are three identifiable subpopulations of visitors and that this subdivision is meaningful for analysis of input to planning issues (table 1). On the most recent trips, tributary group sizes were small, compared to all groups on the primary rivers. Commercial groups traveled in the largest parties. Past experience and skill level differences were substantial, with tributary users averaging nearly 50 previous overnight river trips and commercial boaters only about four. Private boaters were near the middle of this range, averaging about 27 previous trips. Tributary boaters reported the shortest trips, averaging less than four nights along the waterways on their most recent trip in the Frank Church-River of No Return Wilderness. Private river trips were longest, with an average of over five nights per trip. Tributary boaters have been making overnight river trips for much longer than the other users. In a self-evaluation of skill level, almost all tributary boaters rated themselves as “advanced” or “expert,” almost all commercial users rated themselves from “beginner” to “intermediate,” and private primary river users tended toward the middle of the scale.

While these basic differences are important in delineating the three primary user types for water-based recreation in the Frank Church-River of No Return Wilderness, when

**Table 1**—Past experience and level of skills for three types of river users in the Frank Church-River of No Return Wilderness.

	User group					
	Main/middle commercial		Main/middle private		Tributary	
Mean group size on most recent trip in FC-RNRW <sup>a</sup>	15.5	C	12.0	B	6.5	A
Mean length of most recent trip in FC-RNRW (nights) <sup>a</sup>	4.6	B	5.5	C	3.6	A
Mean number of overnight river trips anywhere <sup>a</sup>	3.9	A	26.8	B	52.3	C
Mean years since first overnight river trip anywhere <sup>a</sup>	5.8	A	12.1	B	16.3	C
Self-evaluation of river running skills: percent rated advanced or expert <sup>b</sup>	5		40		97	

<sup>a</sup>User groups with different letters have statistically different means at p = 0.05 level (ANOVA with LSD Posthoc).

<sup>b</sup>Groups rated their skills significantly different from each other as tested by the Kruskal Wallis nonparametric test.

**Table 2**—Factor score coefficients for the Frank Church-River of No Return Wilderness boater study.

Trip outcome factor <sup>a</sup>	Items contributing to enjoyment of trip					
	River challenge	Escape from civilization	Social cultural	Physical and emotional health	Companionship	Primitive skills
	----- Factor score coefficients <sup>b</sup> -----					
Sense of personal accomplishment	<b>0.812</b>	0.040	0.093	0.237	0.247	0.061
Self-determination	<b>0.809</b>	0.084	0.105	0.210	0.215	0.115
Mental and emotional challenge of wilderness travel	<b>0.550</b>	0.195	0.004	0.132	0.234	0.281
Physical challenge of the natural world	<b>0.528</b>	0.166	-0.088	0.168	0.354	0.340
Responsibility for others	<b>0.429</b>	-0.001	0.284	0.240	0.231	0.197
Learning new skills and abilities	<b>0.370</b>	0.114	0.359	0.189	0.185	0.171
Using river-running skills	<b>0.359</b>	0.019	-0.064	0.056	0.354	0.270
Experiencing peace and tranquility	-0.018	<b>0.724</b>	0.170	0.187	0.024	-0.084
Escaping noise	0.115	<b>0.552</b>	0.270	0.075	0.037	0.044
Feeling a part of nature	0.185	<b>0.477</b>	0.077	0.228	0.146	0.285
Experiencing solitude	0.045	<b>0.475</b>	0.097	0.108	-0.014	0.152
Getting away from crowds	0.022	<b>0.469</b>	0.091	0.001	0.068	0.093
Taking care of the Earth	0.120	<b>0.417</b>	0.297	0.227	0.087	0.322
Experiencing natural cycles of the Earth	0.122	<b>0.341</b>	0.213	0.286	0.141	0.282
Visiting historical and archeological sites	0.078	0.189	<b>0.795</b>	0.130	0.034	0.142
Learning about native history and culture	0.005	0.220	<b>0.733</b>	0.149	0.007	0.105
Meeting new people	0.005	0.108	<b>0.585</b>	0.025	0.087	-0.067
Spending time with family	0.083	0.249	<b>0.377</b>	-0.021	0.069	-0.097
Finding a sense of self	0.319	0.190	0.115	<b>0.752</b>	0.118	0.099
Spiritual fulfillment	0.175	0.292	0.097	<b>0.623</b>	0.024	0.191
Improving my physical health	0.298	0.141	0.147	<b>0.609</b>	0.297	0.133
Being with others of similar interests	0.314	0.003	0.138	0.268	<b>0.642</b>	0.034
Experiencing closeness with others in my group	0.297	0.129	0.213	0.131	<b>0.631</b>	0.156
Being with friends	0.184	0.077	0.046	0.004	<b>0.603</b>	0.119
Using your wilderness skills	0.367	0.164	0.091	0.203	0.165	<b>0.722</b>
Living simply, with minimal equipment, supplies	0.216	0.252	-0.034	0.140	0.223	<b>0.556</b>

<sup>a</sup>Extraction method: Maximum likelihood. Rotation method: Varimax with Kaiser normalization.

<sup>b</sup>Bold-face coefficients identify items that load highest on that factor. Those items best represent the factor.

past experience on these specific waterways was explored, some overlap in the groups was evident. The tributary sample reported a total of 1,123 trips on these five tributaries. But, these tributary users had also taken nearly 700 trips on the Main Stem of the Salmon River and 1,423 trips on the Middle Fork. Unfortunately, primary route users were not asked about experience on the tributaries.

Trip outcome items broke into six basic factors across 26 of the 30 items (table 2). One factor was based on river challenge items such as the importance of opportunities to use river running skills, the physical challenges of nature, and the importance of a sense of personal accomplishment. A second factor revolved around escape from civilization, with similar importance placed on solitude, getting away from crowds, and feeling a part of nature. A social-cultural factor represented comparable perceptions about the history of the place and interaction with people. Both spiritual and physical well-being were included in one factor, and one factor focused entirely on companionship needs. The last factor focused on opportunities to demonstrate wilderness skills.

While the private users on the Main and Middle Forks overlapped considerably with the other two groups in trip outcomes, the commercial and tributary users differed significantly on five of the six factors (table 3). Commercial

users placed significantly more importance on Escape and the Social-Cultural aspects of the visit, while tributary and private users scored highest on Challenge, Companionship, and demonstration of Primitive Skills.

An evaluation of importance of potential human experience indicators found substantial similarity in the rankings (table 4). The top importance tended to be litter and human

**Table 3**—Comparing strength of trip outcome factors across boater groups in the Frank Church-River of No Return Wilderness.

Trip motivation factor	User group <sup>a</sup>		
	Main/middle commercial	Main/middle private	Tributary
F1: River challenge	A	A,B	B
F2: Escape from civilization	B	A,B	A
F3: Social-cultural	B	B	A
F4: Physical and emotional health	A	A	A
F5: Companionship	A	B	B
F6: Primitive skills	A	B	B

<sup>a</sup>Groups with higher letters alphabetically have statistically larger factor scores at p = 0.05 level (ANOVA with Posthoc).

**Table 4**—Significance of potential human experience indicators in the Frank Church-River of No Return Wilderness by river user type.

This matters to me	Mean score by user group <sup>a</sup>					
	Main/middle commercial		Main/middle private		Tributary	
	Mean	Rank <sup>b</sup>	Mean	Rank <sup>b</sup>	Mean	Rank <sup>b</sup>
Encountering human waste	4.7	1	5.1	1	5.3	2
The amount of litter I see daily	4.6	1,2	5.0	1,2	5.5	1
The number of wild animals I see daily	4.4	2,3	4.6	3	4.8	3,4
The amount of trees around a campsite that have been damaged by people	4.0	4	4.5	3,4,5	4.9	3
Camping within sight or sound of another party	4.0	4,5	4.6	3,4	4.3	5,6,7,8,9
The amount of time within sight of other float parties each day	3.8	6	4.2	6	4.3	5
The number of modern structures (building, airstrip, bridge) seen daily	3.8	6,7	4.1	6,7	4.3	5,6
The number of times delayed at a rapid by float parties each day	3.7	6,7,8	3.9	8,9,10,11,12	4.2	5,6,7,8,9,10,11
The amount of human-caused vegetation loss and bare ground around a campsite	3.7	6,7,8,9	4.1	6,7,8	4.3	5,6,7,8
The total number of people I see on the stream each day	3.6	7,8,9,10	4.0	6,7,8,9	4.3	5,6,7
The historical sites I see daily	3.5	8,9,10,11	3.8	9,10,11,12,13,14	3.6	14
The number of float parties I see on the stream each day	3.5	8,9,11,12	4.0	7,8,9,10,11	4.2	5,6,7,8,9,10
The size of float parties that I see along the stream each day	3.4	11,12,13	4.0	7,8,9,10	4.1	6,8,9,10,11,12
The number of low-flying aircraft I see each day	3.4	11,12,13,14	3.9	8,9,10,11,12,13	3.9	11,12,13
The number of float parties that pass my campsite	2.9	15	3.4	15	3.4	14,15

<sup>a</sup>As measured on a scale from 0 = Not at all important to 5 = Extremely important.

<sup>b</sup>Means sharing the same rank within each group were not significantly different at p = 0.05 as determined by paired t-tests.

waste, followed closely by seeing wild animals, seeing trees around a campsite damaged by previous visitors, and campsite isolation. Seeing historical sites was noticeably lower ranked, however, for tributary users and private boaters. For all users, the number of float parties that pass the campsite was ranked virtually the lowest in importance.

The three groups demonstrated different attitudes toward potential management activities designed to protect wilderness values in various ways (table 5). Tributary floaters were more supportive of limiting the number of people per party (currently limited on the Main and Middle Forks) and boats per party (not currently limited on the Main and Middle Forks), and controlling nonnative vegetation with chemical applications. Tributary floaters were less supportive of requiring firepans (currently required on the Main and Middle Forks) and supplying floaters with more pre-trip information on historical sites. Commercial floaters were more supportive of establishing launch schedules to avoid congestion and most opposed to limiting the number of people in a floating party. Private parties showed more support for regulations to carry out human waste than commercial or tributary users.

## Conclusions

The Salmon River was known as “The River of No Return” by early explorers because it was thought to be unnavigable. Even when the first wooden boats were able to safely navigate its waters, the trips were one-way and the boats were

disassembled and used for building structures. In today’s wildland planning efforts, emphasis must be on avoiding some future point when we recognize the need to “return” this River to its wilderness heritage. Preservation of opportunities to experience this wilderness state should be the product of the planning process. Planning requires understanding of the critical aspects of human experience met through interaction with wild places.

In understanding what human experiences are associated with wild rivers, a variety of types of users must be included in the analysis. From this study, the differences in past experience levels for the three primary study groups suggest that we have successfully obtained information from distinct subpopulations of visitors. The range in length of time since first floating the river and in the number of past trips, party sizes, length of trips, and personal perceptions of river-running skills most likely far exceed the variation commonly present in other forms of considering indicator significance (task forces and interdisciplinary planning teams), although this has never been directly assessed. The high level of experience the tributary users have on the primary river routes is likely much higher than experience levels of most other wilderness floaters, making them a unique subpopulation of visitors. Responses reflecting this range of experience should carry weight in representing visitor needs in deciding future management actions. Of course, other criteria must be considered in final decisions about management, including protection of the resource, health and safety, legal mandates, and agency policies.

**Table 5**—Attitudes toward potential management actions intended to protect wilderness values in the Frank Church-River of No Return Wilderness.

Management action	User group								
	Main/middle commercial			Main/middle private			Tributary		
	Mean <sup>a</sup>	Support	Significant difference <sup>b</sup>	Mean <sup>a</sup>	Support	Significant difference <sup>b</sup>	Mean <sup>a</sup>	Support	Significant difference <sup>b</sup>
	<i>Percent</i>			<i>Percent</i>			<i>Percent</i>		
<b>Stream accessibility</b>									
Increase parking spaces at launch sites	-0.6	8	A	-0.6	12	A	-0.5	17	A
<b>Social issues</b>									
Close selected campsites within sight or sound of each other	0.0	37	A	0.0	37	A	0.0	32	A
Establish an allowable number of people per float party	-0.2	25	A	0.3	46	B	0.6	68	C
Establish an allowable number of boats per float party	-0.3	20	A	-0.3	29	A	0.1	50	B
Establish launch schedules to avoid down-river congestion	0.6	63	B	0.0	39	A	-0.2	36	A
Require firepans	1.3	87	B	1.4	91	B	0.9	73	A
Require visitors to carry out human waste	0.9	73	A	1.4	88	B	0.8	64	A
Offer more pre-trip information on historical sites	0.9	71	B	0.8	64	B	0.5	52	A
<b>Natural resource management</b>									
Allow natural fires to burn without human intervention	0.3	54	A	0.4	58	A	0.6	61	A
Allow human-caused fires to burn without human intervention	-0.9	15	A	-0.8	17	A,B	-0.5	11	B
Control non-native vegetation through chemical applications	-0.7	31	A	-0.6	23	A	-0.3	16	B
Establish closures around endangered/threatened species nests and dens	0.0	71	A	0.6	62	B	0.9	49	B

<sup>a</sup>As measured on a scale from -2 = Strongly oppose to +2 = Strongly support.

<sup>b</sup>Groups sharing the same letter did not differ significantly on attitude toward that management action. Significance at p = 0.05 was determined by ANOVA with LSD or Tamhane posthoc tests.

Tributary and private primary route floaters were found to focus on entirely different aspects of the wilderness river trip than commercial floaters. Enjoyment came from the challenge of traveling, using primitive skills to travel, camping and cooking, and spending time with others of similar interests. Commercial users, however, obtained more enjoyment from feelings of escape from civilization, learning about people and the place in the past, and being with people.

The ranked order significance measure again illustrated how much less important the social-cultural considerations are for tributary users and private boaters. Generally, however, there is the suggestion of similar feelings about the order of importance of many aspects of things encountered in the wilderness.

While tributary users were less supportive of expanding some of the restrictions that apply on the primary routes to the tributaries, they led in support for limiting the number of people per party and the number of boats per party, and in using chemicals to control weeds.

There is a wide range of opportunities provided currently at the Frank Church-River of No Return Wilderness. This research has helped us understand differences in important aspects of visits across these three types of float boaters. Commercial floaters tend to be more interested in escape

and social-cultural aspects of the visit. They can ponder the place, focus on the forces of nature that formed this place, and witness the relationship humans have had, and continue to have, with this wild place. The tributary floaters, on the other hand, tend to focus more on the challenges of river travel, self-dependency, and sharing the challenges with friends. Private floaters represent the middle of the spectrum, possibly some with ambitions and desires similar to the tributary floaters, but simply at an intermediate step in the specialization hierarchy. Some will move on to include these more challenging experiences, and some will not.

Most importantly, these findings substantiate the fact that people define “wild” experiences in a variety of ways. Planning must acknowledge these differences and must appropriately attempt to accommodate, through intentional management actions, these different orientations to the River of No Return.

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