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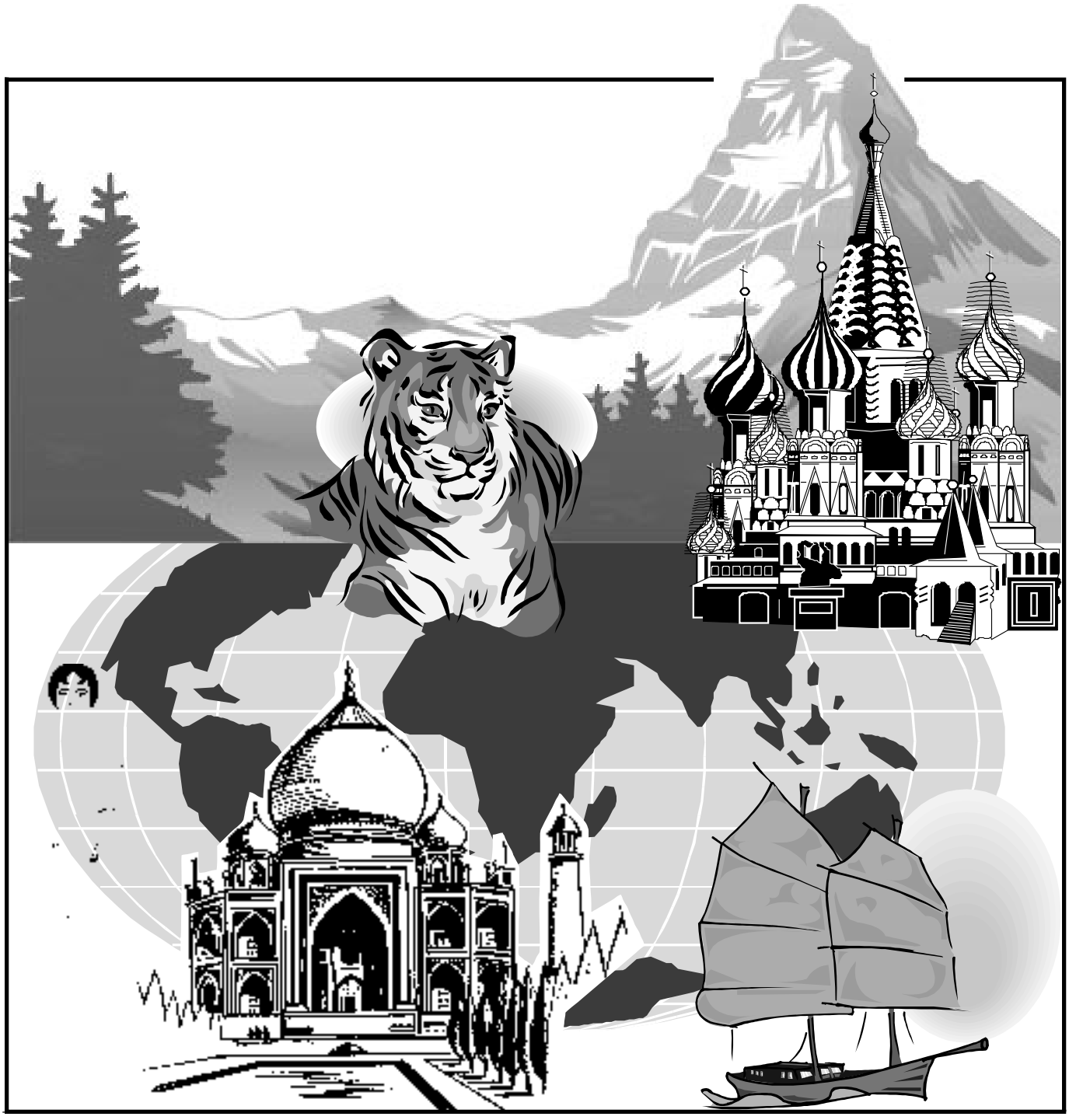

Abstract

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The papers contained in Volume II of these Proceedings represent a combination of papers originally scheduled for the delayed 1997 meeting of the World Wilderness Congress and those submitted in response to a second call for papers when the Congress was rescheduled for October 24-29, 1998, in Bangalore, India. Just as in Volume I, the papers are divided into seven topic areas: protected area systems: challenges, solutions, and changes; understanding and protecting biodiversity; human values and meanings of wilderness; wilderness for personal growth; understanding threats and services related to wilderness resources; the future of wilderness: challenges of planning, management, training, and research; and international cooperation in wilderness protection.

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

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Personal, Societal, and Ecological Values of Wilderness: Sixth World Wilderness Congress Proceedings on Research, Management, and Allocation, Volume II

Bangalore, India, October 1998

Compilers:

Alan E. Watson
Greg H. Aplet
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Preface

The Sixth World Wilderness Congress met in Bangalore, India, October 24-29, 1998. Volume I of these Proceedings, with 27 papers, was published at that time. This was made possible due to the postponement of the Congress, originally scheduled for 1997, but delayed due to political considerations within India. This second volume contains some papers originally scheduled for presentation in 1997, but is larger than originally expected due to a second round of acceptance of papers prior to the 1998 session.

The papers included in this volume represent the knowledge brought together and shared at the scientific meeting associated with the Congress, entitled "Personal, Societal, and Ecological Values of Wilderness: Sixth World Wilderness Congress Symposium on Research, Management, and Allocation." Every paper in this proceedings received peer edit by two of the compilers, and all copyrights are released by contributing authors.

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 both volumes. We also extend a special thank you to Janet Sproull of the Leopold Institute for continued dedication to making this knowledge available through persistence during the original call for papers, the postponement, the second round of paper reviews, coordinating editing and revision of all papers, and finally coordinating review of page proofs. Janet did an outstanding job in all capacities. Her many new friends around the world certainly join us in this heartfelt thank you.

The Compilers, April 2000

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

The World Wilderness Congress in Bangalore, India, began with a warm welcome to the international delegates (photo by Jeff Barney).

The Hotel Ashok in Bangalore, India, was the Congress venue (photo by Jeff Barney).

Converging Protected Area Policy: A Case Study of the Russian Zapovednik (Strict Nature Preserve) and American Wilderness Systems

David Ostergren
Steve Hollenhorst

Abstract—Historically, while the United States and Russia have some policy similarities, each country has placed a unique cultural and political stamp on the role of their protected areas. Russian zapovedniki have existed since 1916 and are areas emphasizing preservation of typical or unique ecosystems primarily for ecological research (Weiner 1988). In contrast, American Wilderness Areas were set aside primarily for people to access and enjoy. This analysis compares Russian and American protected areas policies and concludes that the policies are converging.

Russian zapovedniki have existed since 1916 as areas that protect typical or unique ecosystems primarily for ecological research (Weiner 1988). In contrast, American wilderness areas are set aside primarily for people to access and enjoy. Although the two systems are founded on much different societal values, they are comparable because they both represent relatively large, nonmilitary areas with the highest level of protection from development and economic use in their respective countries. This analysis compares converging Federal management policies for protected areas in Russia and in the United States.

Three sources of empirical data were employed to conduct this analysis: (1) official document sources such as laws, agency policy statements, and legislative and professional society debates; (2) archival and dependable secondary sources; and (3) formal and informal interviews with policy leaders. Formal, open-ended interviews with zapovednik directors and officials provided data on the current status of Russian policy. This analysis also used informal interviews with officials, nongovernment organizations, scientists, and historians. Commonalities between the Russian and American conservation systems have received only brief mention in previous work (Pryde 1972, 1991; Weiner 1988), and a comparison of preservation policies is largely unexplored.

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Policy Convergence

Convergence theory in transnational comparative political science is regarded as the tendency of societies over time to solve similar problems with similar solutions, despite different political processes. In general, the literature focuses on democracies in Europe, Canada, and the United States (Bennett 1991). This comparison of Russia and the United States allows for an interesting opportunity to investigate convergence in two dissimilar nations.

Policy convergence occurs when two countries become similar in terms of policy goals, content, outcomes, or style (Bennett 1991). For the purpose of this discussion, analysis is focused primarily on converging goals and content, or the coming together of intent to deal with common problems (such as protecting natural areas). Policy content includes the statutes, administrative rules, and relevant regulations affecting the policy area. Seelinger (1996) suggests that efforts to analyze convergence focus on a specific content area at two distinct periods of time. This article demonstrates that Russian and American policies had distinct goals and content around 1930. Since the mid-1970's, the policies have converged, culminating in more similar policy goals and content by 1998.

Wilderness Policy in the United States

United States wilderness philosophy and legislation is well documented (Allin 1982; Nash 1982). The early preservationist movement in America is characterized by the late 19th century transcendentalists. They embraced the romantic notion of the sublime; that is, the aesthetic, intrinsic beauty of wild areas. Wilderness was viewed as a source of inspiration. The motivation for the United States Department of Agriculture's Forest Service to protect wilderness found voice with men like Aldo Leopold. Leopold reasoned that wilderness "serves as the highest recreational use," and may serve the need for civilized people to experience outdoor, pioneer-type recreational activities (Leopold 1921). Increasing demand for access to primitive recreation opportunities such as horse packing trips, big game hunting, and fishing influenced the Forest Service's decision to designate the Gila Wilderness Area in New Mexico in 1924.

The United States National Park Service Organic Act of 1916 was passed amid growing popular support. The Act stipulated the conflicting goals of "(1) conserving the scenery and the natural and historic objects and wild life therein,

and (2) providing for the enjoyment of the same leaving them unimpaired for future generations." In the 1920's, some people supported scientific research on unmanipulated ecosystems, some people supported the aesthetic and recreational values of wilderness while others, such as the railroads and automobile industry, promoted easy access and full visitor facilities. (Note: the terms "wilderness" and "primitive areas" are used by the Forest Service and the National Park Service at various times to refer to basically the same type of area. We use "wilderness" throughout the rest of the document.)

Science in Natural Areas

Initiated in 1927, research reserves have been described as "the most preservation-oriented land use category the National Park Service had yet devised" and as precursors to wilderness areas (Sellars 1993). Although in the early 1930's the National Park Service added wildlife biologists who emphasized an ecosystem approach, in practice the natural research reserves were unused and remained too small to protect pristine ecosystems. By the late 1930's, the research reserve program had been largely abandoned and the National Park Service continued to emphasize recreation and developing roads for access (Sellars 1993, 1997).

The Forest Service alone maintained Research Natural Areas over time. In 1925, the Forest Service designated these areas for research on land similar to timber producing sites. By 1953 there were 27 Research Natural Areas. However, the areas remained small, and large ecosystem processes could not be studied. In the long run, the Forest Service placed much more emphasis on Experimental Stations and work in nurseries, management, and genetics (Doig 1976). Clearly, scientific research was not used as a primary rationale for the creation of wilderness areas.

Wilderness and the Hegemony of Recreation

By the 1930's, a small but visible role for wilderness recreation was established in the Forest Service and in the National Park Service. Advocacy for more areas culminated with the 1964 Wilderness Act as the first Federal legislation in the world to protect areas for wilderness qualities. The primary goal was to provide current and future generations with opportunities for solitude and primitive, unconfined recreation. Some parenthetical goals for wilderness are mentioned such as education, protecting unique geologic or historic objects, and conducting science. It is significant that the bottom-line goals of wilderness areas remained unchanged from the 1930's, namely the preservation of unmodified wild lands for unconfined recreation purposes (Nash 1982).

Growth of Science as a Wilderness Value into the 1990's

Evidence from the 1970's indicates that ecological research emerged as a rationale for maintaining and creating wilderness areas. By 1980, the wilderness system had expanded, and research that required large land areas (such as grizzly habitat) was much more suited to wilderness than Research Natural Areas (Cutler 1980). A gauge for the rise of research in wilderness may be Butler and Roberts' (1986) report that between 1970 and 1980, 731 of the total 851 research projects conducted in wilderness were on topics in the natural sciences.

The Wilderness Society (1994) position is that wilderness is valuable for more than just recreation and aesthetics. Wilderness should be supported because it protects watersheds for pure water, provides critical habitat for plant and animal species, improves air quality through the filtering action of the plants and trees, maintains gene pools, and serves as unique and irreplaceable living "laboratories" for scientific and medical research. In addition, baseline ecological research on wilderness areas appears to be expanding as government agencies and the academic community use large, relatively natural conditions (Meersman 1997). Despite renewed science-based decisionmaking, it appears that the funding for basic biological research remains inadequate (Kenner 1998; Sellars 1997).

Zapovednik Policy in Russia

Early 20th century zapovedniki were designated for baseline ecological research and to protect habitat for endangered species. In the 1980's, this policy was broadened to include ecotourism and environmental education.

The Formative Years of Russian Protected Area Policy

Yanitsky (1993) notes that in the late 19th century, expanding Russian democratic associations were criticizing the Tsar and speaking out against abuses resulting from development. An increased rate of exploitation and disintegration of species was attributed in part to an expanding population and in part to the effects of capitalism (Bannikov 1966). Disappearing resources and an increase in public criticism prompted debate over Russia's use of natural resources. Within the Russian Academy of Science, various scholars advocated land preservation for scientific purposes (Weiner 1988). In 1908, G. A. Kozhevnikov presented a conference report and called for establishing reserve plots:

> The first reason is purely scientific. The second is practical because only a scientific study of nature can provide a firm basis for practical activities. Let us remember that agriculture is no more than applied science…we must consider the conservation of nature, at least in some places, in all its natural inviolability.

As the scientific community promoted reserves for research, another coalition sought preservation for aesthetic values. The movement was rooted in romantic German and Swiss visions of preserved landscapes (Weiner 1988). As it turned out, this romantic and moral argument had only a minor policy influence, and the bulk of early reserves were dedicated to scientific purposes.

In 1919, the Ilmen'ski Zapovednik was established to protect its unique geological and mineralogical features. This Zapovednik became the first area in the world protected primarily for scientific reasons (Weiner 1988). In 1921, Lenin issued the decree "On the Protection of Monuments of

Nature, Gardens, and Parks," which set the official policy that zapovedniki were exclusively earmarked for the solution of scientific problems (Bannikov 1966). By 1930, after a protracted battle over whether zapovedniki should be pristine areas or experimental stations, it was decided that the term "zapovednik" could only be applied to research areas preserved in pristine condition (Weiner 1988). From this time onward, the zapovednik policy focused on ecosystem research. In 1960, the Russian Republic Supreme Soviet passed the Law on Conservation, reaffirming that zapovedniki are permanently withdrawn from economic use for scientific research (Current Digest of the Soviet Press 1960).

Trauma and Change

The economic and political systems in Russia were completely reorganized after the fall of the U.S.S.R. in 1991. As one result, zapovedniki faced a 60 to 80 percent reduction in Federal funding, affecting all aspects of management and research (Grigoriew and Lopoukhine 1993; Ostergren and Shvarts 1998; Sobolev and others 1995). Fortunately, not all the changes in post-Soviet Russia were negative. Despite a drop in Federal funding, in 1998 Stepanitski (1998) reports that 99 zapovedniki now protect over 31,000,000 hectares of land in Russia—a 30 percent growth since the fall of the U.S.S.R.

The most significant indicator of policy change and adaptation is the 1995 Law on Specially Protected Natural Areas. Overall, it is viewed as a positive shift in management strategies. This is the first time in Russian history that directors and government inspectors have been given legal authority to manage zapovedniki (Federal Law 1995). Article 7 states that the goals are:

a) the protection of natural areas with the dual goals of preserving biological diversity, and the maintenance of protected natural complexes,
b) organization and performance of scientific research,
c) ecological monitoring,
d) environmental education (which may include ecotourism),
e) participation in Expertiza (environmental impact assessments),
f) assistance in training the conservation and scientific community.

As of 1995, the system was fulfilling the first three goals much better than the last three (Sobolev and others 1995). Nonetheless, these last three goals incorporate the use of protected areas for environmental education and ecotourism (aesthetic appreciation and unconfined recreation)—these goals are traditionally associated with the United States' Wilderness System.

Discussion of Convergence

The protected area policies of Russia and the United States are more similar in 1998 than in the mid-1930's. Although the degree of similarity is debatable, it is clear that zapovednik policy has incorporated recreational and educational values, while science has achieved a more prominent role in American wilderness. Several factors have worked to move each nation toward the other.

"Determinism" is a factor in convergence when only one solution is feasible given the nature of the problem (Bennett 1991). It may be argued that policy convergence only represents a process whereby one country actively adapts policies from another country. However, natural resources have long-term, semi-stable characteristics that exert a determinate influence on a country's wealth and power (Siegel and Weinberg 1977). Protected areas in both nations share commonalities such as movement of species, air and water across boundaries, infinitely complex biotic relationships, shifting fire and weather patterns, and the absence of anthropogenic influences. Russia initially restricted all access, though they are now opening these places to some educational and ecotourism purposes. The United States initially de-emphasized but now recognizes that baseline data is an important ingredient for making decisions on large, complex ecosystems. Regardless of whether the main emphasis in each country is for research or recreation, the scarcity of funds and narrow band of advocates dictate policies that broaden political support.

"Harmonization" is working together across national borders, often with support of international policymaking bodies who recognize the interdependence of countries for success. On May 23, 1972, the U.S. and U.S.S.R. signed an agreement to protect the environment from pollution and to exchange strategies for the preservation of nature and management of reserves. Since the signing of the 1972 agreement, conservation agencies have supported over one-thousand exchanges of specialists in rare and endangered species. The agreement was renegotiated in 1995, with nature reserves targeted for several initiatives (National Biological Service and Russian Academy of Sciences 1996).

The United Nations Educational, Scientific and Cultural Organizations (UNESCO) Man and the Biosphere (MAB) program provides another example of harmonization. MAB seeks to establish an international network of Biosphere Reserves representative of the world's ecosystems. The three primary goals are (1) to better conserve biotic resources, (2) to provide areas for baseline environmental research, and (3) to provide areas for education and training (UNESCO 1974). In 1996, the Russian Federation added another reserve for a total of 17 Biosphere Reserves. Many United States agencies are also participating in the UNESCO MAB program, with 47 biosphere reserves in existence as of 1996. Regular scientific conferences throughout the world expedite the exchange of information on management research. In this instance, the United States converged toward Russian policy by increasing emphasis on research. The creation of Biosphere Reserves in both nations is tacit recognition that choices for natural resource management translate across political boundaries.

Another influential international body is the World Conservation Union (IUCN). The IUCN (1994) defines zapovedniki and wilderness areas within Category I as "Strict Protection." The objectives of Category Ia, Strict Nature Reserve (such as zapovedniki) are:

> to maintain natural processes in as undisturbed state as possible; to secure examples of the natural environment for scientific study, education, and environmental monitoring;

to provide for the maintenance of genetic resources in a dynamic and evolutionary state; and to limit public access.

Category Ib, Wilderness Areas, have the additional objectives of recreational use and to ensure that future generations have the opportunity to enjoy relatively undisturbed natural areas. Only slightly different, zapovedniki and wilderness fulfill an important category in the IUCN scheme of conservation.

"Emulation" is when policymakers from one country copy or adapt a policy from another (Bennett 1991). A country may be used as a model, or the actual wording in policy content is similar. In the late 1980's, the Russian environmental movement became a legitimate platform to criticize the government and ultimately contributed to the fall of the Soviet Union (Jancar-Webster 1993). As one result, the Federal government opened the path for public participation in policymaking. Section 1, article 5 of the 1995 Russian Law on Specially Protected Natural Areas specifies that citizens shall take an active role in the management of protected areas and that agencies must take into consideration the suggestions of the local citizenry. This particular section of the act resembles the rights for public participation in the 1964 Wilderness Act and the 1969 National Environmental Policy Act. Awareness of American law and the similarity of wording indicates an emulation of United States legislation.

Little evidence surfaces in the literature that the United States directly adopted zapovednik policies. However, agency personnel were most certainly aware of the work on protected areas in the U.S.S.R. For instance, the Office of International Affairs in the Fish and Wildlife Service has had a modest exchange program with Russian and Ukrainian zapovedniki since the mid-1970's (Kohl, personal communication).

One new goal in Russia is environmental education. In 1996, the first environmental education center opened to develop positive public attitudes toward protected areas. Interest has also grown for supporting ecotourism—ostensibly to build global awareness and help raise funds. Tourism and ecotourism are still met with suspicion, but several directors are actively pursuing tourists interested in natural history (Laren, personal communication). The environmental education movement emulates the United States as well as several other national strategies.

"Penetration" is a factor in convergence when members of one polity serve as the participants in the political process of another. Consistent with observations by Siegel and Weinberg (1977), nongovernment organizations play an important penetrative role in converging policies. In the 1970's, both nations experienced a general growth in environmental awareness. The political climate of the 1960's and 1970's profoundly shifted American land management policies toward a biocentric view (Nash 1982).

The Russian environmental movement had slightly different roots than the American movement. In the fifties, sixties, and early 1970's, the scientific community was the center for environmental awareness. During the Soviet era, technical information was censored from the general public, and only scientists had access to the harmful effects (potential or actual) of industrial pollution. One result was that friends, spouses, and children of concerned scientists were influenced during "kitchen discussions" over tea (Yanitsky 1993). Children in the 1970's developed into a substantial cadre of environmentally concerned citizens and activists who fueled the green movement. Many of these environmentalists are affiliated with conservation and zapovednik issues. By the late 1980's, environmentalism had penetrated the political process to shape Federal policy (Jancar-Webster 1993).

"Democracy" is the most difficult postulate to substantiate in this discussion of converging protected area policy. The implication is that as nations increase public participation, the policy choice is to create protected areas and expand public access to wild lands—in effect, create wilderness areas. There is little doubt that increased participation has affected zapovednik policy. Both the emulation process and penetration rely on public access to policy and public input. Overbye (1994) proposes that democracy contributes to convergence by diluting the ability for leaders to dictate public policy. A fundamental difference in the two governments was the lack of citizen participation in the Soviet legislative process. Leaders often issued decrees and the Supreme Soviet rubber-stamped associated legislation (Peterson 1993). Now nongovernment organizations are actively lobbying in the Russian political process. Unfortunately, in light of the 1998 budget reduction for zapovedniki, the political clout of zapovednik interests appears to be limited (Stepanitski 1998). Nonetheless, public participation exists in a society that had no participation outside the communist party for 70 years. It can be argued that one reason the Federal government continues to establish zapovedniki (several in 1997 and 1998) is to maintain a "green" image to the polity. The green image is a nod to voters and the democratic process.

Instances certainly occur whereby the American public is deprived of participation in environmental policy. However, citizens are fundamentally guaranteed the right of participation, if by no other means than by the judiciary (Jones and Taylor 1995). The general trend for Federal agencies is to preempt litigation by negotiating and involving the public prior to action. A result is that policies guiding natural resource management now include a broader definition of values and goals, such as biodiversity conservation.

Figure 1 illustrates the pathway for converging protected area policies. Although both nations had similar movements supporting the establishment of protected areas, contrasting cultural and political conditions kept the policies distinct until the 1980's. The evidence suggests that harmonization and emulation elements surfaced in the 1970's. In the 1980's, environmental organizations penetrated the policy process. And finally, democratization surfaced in the 1990's and influenced policy in Russia significantly.

Conclusion

Although Russia and the United States protect areas in their pristine natural conditions, they developed culturally distinct philosophies and policy goals in the early 20th century. Russia emphasized ecological research while the United States favored recreational and aesthetic values. From the mid-1970's to 1998, the policies in both nations converged, reflecting a dynamic social process of reevaluating the role and purpose of protected areas.

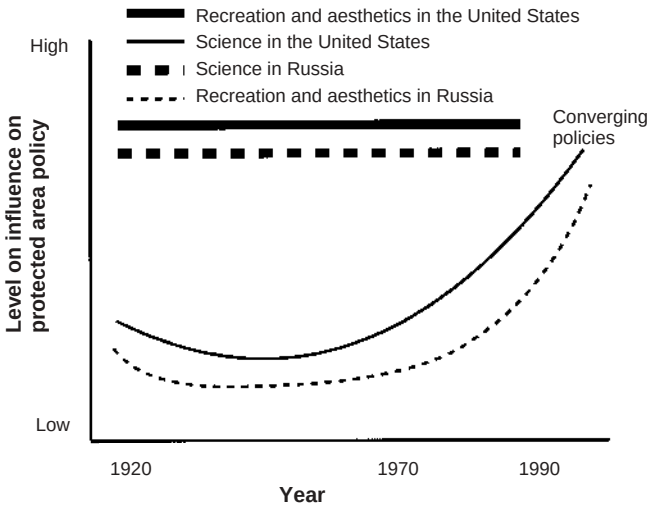

Figure 1—Convergence of Russian and American protected area policy.

Convergence theory helps policy analysts understand the process of two dissimilar countries adopting similar policy goals and content. The process of converging protected area policy can be explained by the deterministic nature of the problem itself, harmonizing international objectives, emulating successful policies, national and international non-government organizations penetrating the political process, and democratization of the policy making process.

It is unlikely that nations will dilute their primary goals for establishing protected areas to the point that the world only has one type of protected area. However, the analysis is useful to consider for all nations establishing new protected areas. For instance, nations setting up new policies or strategies for protected areas can adopt language and strategies from established protected area systems. Established systems can work as models to be meshed into an existing culture while accounting for the various rationales for protected areas. This analysis demonstrates that convergence is a useful tool in analyzing trends and explaining similarities across dissimilar nations and their Federal protected area policies.

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The Wilderness Concept and its Philosophy in Italy: The History and the Successes of the Idea as a Conservation Principle

Franco Zunino

Abstract—The Associazione Italiana per la Wilderness (The Italian Wilderness Society) was founded in 1985. The organization brought together "spirited people" to battle for wilderness, with initial efforts toward spreading the wilderness philosophy and conservation concept while facing head-on the challenge of creating protected wilderness in a highly populated country, where land is mostly privately owned, and few wild places remain on public lands.

In Italy, the Wilderness concept as a conservation principle was for the first time illustrated by myself in the early seventies, after I discovered it in some American environmental magazines and books. "Per un' Idea di Wilderness" (For a Wilderness Idea) was the motto I coined for my private campaign, in the early 1980's, for the knowledge and spreading of the Wilderness philosophy and concept in Italy; and Documenti Wilderness (Wilderness Papers) was the newspaper I began to publish for such a campaign.

There was a need to connect this campaign to a specific place so that people, particularly environmentalists, could more easily understand a Wilderness place and the importance of preserving others like it. The area I chose to focus on was, and still is today, the wildest area remaining in the whole European Alps: the Val Grande and its surrounding mountains. Thanks to this initial focus and to the help obtained from some resolutions approved by two World Wilderness Congresses, today the Val Grande is a National Park. Though a pure Wilderness concept is not applied, it is at least taken into consideration as a value to be preserved when managing the Park (and, unfortunately, as a touristic slogan too!). This was the first real victory for the Wilderness Idea movement in Italy.

After some years of effort and my participation in the 3rd World Wilderness Congress in Scotland in 1983, interest grew, and I decided to found the Associazione Italiana per la Wilderness (The Italian Wilderness Society), with the aim to aggregate "spirited people" to battle for Wilderness.

The Associazione Italiana per la Wilderness (AIW) was founded in 1985, and immediate efforts were toward spreading the Wilderness philosophy and conservation concept. In 1988, the very first Wilderness area was designated in Italy and in Europe: Fosso del Capanno, a small part of a larger wild and roadless valley. This first Wilderness area, established with an agreement between the AIW and a private foundation, soon grew, enclosing Regional Forest Service lands and Municipality public lands. (Now the Fosso del Capanno Wilderness area is 760 hectares, encompassing almost all of the remaining roadless area.)

The question remained of how to establish Wilderness in a country as highly populated as Italy, where land is mostly privately owned and few wild places were left on public lands. We chose the democratic approach to Municipality government members—people elected to administrate the Municipalities. We obtained designation of one Wilderness Area by means of the decision of a local authority, and others followed. In such wild places, we sought serious commitments for the preservation of the wild characteristics of the areas, with neither roads nor buildings permitted.

To gain public support, we adopted a specific political action based on the concepts of self-resolution and rationality. We emphasized to local people the necessity of preserving their own environmental treasure and not to depend on imposed higher authorities. Rational use of the protected renewable natural resources include hunting, woodcutting, and grazing (and we are now working for a touristic use to be managed within a carrying-capacity framework). Thus, we have not been opposed by these categories of resource users. Without their support, it would be almost impossible to obtain local acceptance for environmental preservation in Italy.

In selecting specific places for protection, we adopted the United States' criteria for designation, but with a European adaptation due to ancient settlements characterizing the environment; there are many artifacts everywhere, and natural landscapes always show signs of man's manipulation. A second important adaptation was due to the extensive private properties in Europe, and also due to local rights to use natural resources on public lands. Most important among selective criteria was the wild aspect of the areas to be protected, with emphasis on the naturalness, isolation (with a very wild core), and integrity (unbroken by roads or any other artificial lines).

The legislative aspect was another challenge to proposing Wilderness Area designation and preservation; such legislation is lacking in Italy. We resorted to administrative measures by public bureaus that manage lands, based on the moral aspect of any agreement: the will of respecting it. We first suggested the moral, but formal, will to the authorities (Municipalities or Regional Forest Services) to give up and refuse any project of development for designated

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Wilderness Areas; then, we suggested the respect, with a strict protective criteria, of the environmental laws existing on the Areas.

Such a method is extremely democratic because it is based on a local consciousness of the values of the wilderness qualities of a place, instilling within the people the importance of being directly included in preservation efforts. This was the greatest contributing idea to promoting the designation of Wilderness Areas in a country where neither State nor Regional laws exist to recognize such a type of conservation preservation.

Since the first Wilderness Area was established, year after year, the AIW has obtained additional Wilderness designation; some are from Municipal or Regional Forest Service authorities, and in rare cases, from private holdings. A total of 12 areas are designated now.

The second Wilderness Area designated was also the very first designated by a Municipality. The Monte Cesima Wilderness Area, located near the site where the World War II battle of Cassino and Monte Lungo took place, was designated in 1990, and recently enlarged to another Municipality for a total of 1,310 hectares.

Designated next was the smallest of the Areas near the town where I now live. Monte Camulera (Bric Zionia) is a mere 53 hectares, but with the concrete possibility to have it soon enlarged to over hundreds of hectares of woods, thanks to a private acquisition by a patron member of the AIW.

Designation of the largest Italian Wilderness Area was cause for celebration! Establishment of this Area protects a wild valley in the Dolomite Mountains of the Oriental Alps chain, part of a larger wild area of almost 40,000 hectares that the AIW hopes to have designated in the future for preservation. Valmontina Wilderness Area, with a core area of about 1,000 hectares was designated by the Regional Forest Service, and with common lands, combine for a total of 3,340 hectares.

Other Wilderness Areas include the 2,640 hectares of the Ernici Orientali; the nearly one thousand hectares of Gola del Fiume Rapido and the nearby I Monti Bianchi Wilderness Areas; the Monte Camino Wilderness Area, site of the famous feudal Captain Ettore Fieramosca ancient Fief; and the smaller Eremo dello Spirito Santo and Monte Caira-Gole del Melfa Wilderness Areas near the Castle where the monk philosopher Saint Tommaso d'Aquino was born. All of them are in the Central-Southern Region of Italy.

Last spring, we obtained another important inclusion in our unofficial system preserving Italian wild areas: the Val di Vesta Wilderness Area, authorized by another Regional Forest Service office, and protecting a wild valley in the mountainous region of the well-known Garda Lake. This Area, the first in a Regional Natural Park, starts a new principle for us: preserving wild lands in officially protected areas.

What is important to explain here is that such an activity is strictly based on the United States Wilderness concept, not only as a mere preservation of wild areas (obtained also according to the laws of National or Natural Parks), but also preserving them in the spirit of Aldo Leopold and Robert Marshall, the Wilderness Act spirit, with declared intentions of a "wilderness preservation with a forever wild concept." The designations are all following the steps of the American Wilderness preservation history. We have indeed obtained local (Municipality) and bureaus of land management (Forestry Departments) designation, just like the first Wilderness Areas established in the United States in the years of Aldo Leopold and Robert Marshall—a step toward obtaining Wilderness values preservation by means of Regional or National Government laws in the future.

As in many other countries, in Italy, too, wild area preservation is perceived to conflict with some needs of the local people: owning land or having the right to use natural resources. Any type of National Park or Preserve is also conflicting with such rights, however. We have National Parks that were established almost 80 years ago, where these conflicts haven't been solved, largely because of their extremely large sizes, and in many cases, expanding into lands with little or no natural value and into towns. These lands are enclosed in National Parks and forbid hunting or other activities used for financial gain.

The Wilderness Idea in Italy is to preserve only the remaining strictly natural wild areas, with emphasis on local people preserving them for their purposes (self-resolution) and with Municipality support. Now, what is important to know is that this type of Wilderness is not, as Vance Martin (The Wild Foundation) suggested in his 5th World Wilderness Congress speech, of first-class value. He divided the Wilderness Systems of the world into three classes; the Italian system has correctly been placed in the lowest, or third class, because they are not inviolate or virgin places and have been established by local or regional authorities only.

In Italy, therefore, we have Wilderness Areas where local people have given up building any type of roads or buildings, and in some cases (public lands) wood harvesting too, but where hunting, grazing, and private woodcutting are allowed. We have obtained guarantees against mass touristic use of them, and against "taming" them, so that these Areas can remain as wild as they were and are now, maintaining their wild character and ancient human uses.

I am now proud to relate to you recent events at the Italian Wilderness Society. The twelfth Italian Wilderness Area was recently designated in a famous natural landscape of Italy, and Europe too. It is the River Po Delta, where the local community (Porto Tolle Municipality, in Vento Region) opposed a Natural Regional Park, but instead chose Wilderness classification for durable, self-resolution environmental protection—a solution that obtained the unanimous recognition of all the members of the local government and of all the local organizations for natural renewable resource use, such as hunters, fishermen, mussel breeders, and countrymen. This choice hopefully will soon be recognized by the Provincial Government and by the Regional authority as well.

An act of the Provincia di Frosinone (Frosinone Provincial Government) recognized only last September the four Wilderness Areas designated in that Province by the local municipalities and for any other such Areas designated in the future. This is an important step politically, as it was the first Wilderness Area designation obtained by a Municipality—a step that we hope may be the first toward other Provincial recognitions and for future acceptance of the Wilderness Idea in both the Regional and National Governments.

Another important step will be obtaining more Wilderness Area designation for the wild areas existing in Regional and National Parks. We hope that the Val Grande National Park will be mostly all designated as wilderness and so managed, although some forces are still opposing such recognition. For the management staff of the Park, the word "wilderness" has, so far, only been a touristic slogan.

Today, we have 12 Wilderness Areas in six Italian Regions for a total of over 15,000 hectares, and we are working to enlarge them and to also obtain designation for many other Areas. Included among these are: The Serra Lunga-Lacerno Area in Abruzzo (the finest of them), with a deep gorge and a large Apennine plateau inhabited by bears, wolves and the Abruzzo chamois; the Monte Polveracchio Area, home to a dense, mature beech forest in Southern Italy; and the Is Canargius drainage, one of the wildest areas of chaparral providing habitat for the remaining red-listed Corsican red deer in the Sardinia Region. There remains much to be done to protect Italy's wonderful wild places.

Management of Commercial Air Tourism over National Parks

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Abstract—Over the past decade there has been growing controversy regarding the role of air tourism over National Parks and how the orientation of these commercial visitors could be reconciled with those of more traditional visitors. Agency meetings, media reports and editorials, legal briefs, and regulatory hearings have been the forums for contentious debate. The management challenge is extremely complex and until recently has defied solution. The core problem is that this aerial tourism is occurring at the regulatory interface of two major United States Government agencies that have very different mandated missions—the Federal Aviation Administration and the National Park Service. These agencies creatively employed a Federal advisory body known as the "National Parks Overflights Working Group" to recommend a way to regulate commercial, park-dependent air tourism. The Working Group, comprised of aviation interests, environmental interests, and a Native American representative, carefully crafted a solution that blended the authorities and responsibilities of the two agencies into a regulatory mechanism that has been deemed workable and acceptable to all parties. The Federal Aviation Administration, in cooperation with the National Park Service, is now converting this compromise process into a proposed Federal Aviation Regulation, even as the United States Congress is on the verge of converting it into law. If successfully implemented by the two Federal agencies, this approach to managing air tourism over National Parks may provide a solution wherever this type of tourism generates conflict.

Over the past decade there has been growing controversy regarding the role of air toursm and the protection of the natural and cultural soundscapes in America's National Parks. Agency meetings, media reports and editorials, legal briefs, and regulatory hearings have frequently been forums for contentious debate. Legislative action by Congress and some local governments, as well as administrative actions by Federal agencies, have tried to deal with the issue for specific park areas, but until now no approach has been found acceptable by both the aviation and environmental communities.

The scale of the issue ranges from Grand Canyon National Park, where over 30 commercial air tour operators provide in excess of 100,000 tour flights per year, to the State of Hawaii, which experiences the next highest volume of commercial air tour overflights in the Nation, to Great Smoky Mountains National Park where one air tour operator conducts multiple low-level overflights daily, to Rocky Mountain National Park where several air tour operators have contemplated operations (and local, county, and State governments, as well as the State Congressional delegation, expressed their strong objections). Because of the diversity in parks, park purposes, significances, visitor experiences, and industry type and size, the effect of commercial air tourism on park units is also variable. Nevertheless, increasing numbers of overflights over noise-sensitive parks have sparked significant public debate and controversy related to safety and impacts on park resources and the visitor experience.

The National Park Service recognizes that air tours of parks can provide a service to visitors in terms of sightseeing and access. At issue is the agency's ability to manage the use by allowing it where it is appropriate and compatible with resource protection and visitor experience, and limiting or prohibiting it where it is not. At the heart of this issue is the split jurisdiction between airspace and land management and the different purposes for which these are managed by the Federal Aviation Administration and the National Park Service. The National Park Service regulates (and often limits) recreation and tourism activities in National Parks for the purpose of preserving park resources and providing for a high-quality, sustainable visitor experience. The Federal Aviation Administration regulates National Park airspace for safety and efficiency. Thus, the agencies have not had a common mechanism to address the management of air tourism over parks, the quality of service provided to park visitors, or how this service might be provided in a way that minimizes impacts on park resources and visitors.

After two air tour aircraft collided over Grand Canyon National Park, the United States Congress, through Public Law 100-91 (the National Parks Overflights Act of 1987) asked the National Park Service to identify the nature and scope of overflight problems in the National Park System, the nature of its effects (adverse and beneficial), and what minimum altitude aircraft should maintain when flying over National Parks. The National Park Service came to the following conclusions in its Report to Congress (1995):

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- Commercial air tourism was a National Park overflight issue that the Federal Aviation Administration and National Park Service needed to address.
- Establishing a minimum altitude for aircraft overflying National Parks was neither feasible nor necessary because of the complex nature of impacts on individual park units. The recommended approach was to use a full range of methods and tools (for example, voluntary agreements, incentives for use of quieter aircraft, spatial zoning, altitude restrictions, temporal restrictions, noise budgets, limits on operations, and air tour operations as park concessions).
- The Federal Aviation Administration should develop an operational rule to regulate commercial air tourism over National Parks, triggered by the National Park Service, to address this park overflight issue. The National Park Service further recommended that the Federal Aviation Administration implement a rule that would aid in the preservation and/or restoration of natural quiet—the natural and cultural "soundscapes" of the National Parks.

In recognition of the growing significance, complexity, and controversy of this issue, Secretary of the Interior Babbitt and Secretary of Transportation Pena formed, in 1993, a joint Interagency Working Group to begin addressing the recommendations in the National Park Service Report to Congress. They concurred that increased air tour operations at Grand Canyon and other National Parks have significantly diminished the National Park experience for some park visitors and that measures could and should be taken to preserve a quality park experience for visitors while providing access to the airspace over National Parks. But despite this attention, progress toward resolution of problems was slow, and most of the attention of this group was focused on Grand Canyon National Park, where P. L. 100-91 mandated a "substantial restoration of natural quiet."

National Parks Overflights Working Group

Seeing that the complexity and controversy surrounding Grand Canyon rulemaking resulted in rather desultory progress, President Clinton, in a 1996 Earth Day Executive Memorandum, directed the Secretary of Transportation to work with the Secretary of the Interior to quickly complete Grand Canyon airspace rulemaking and to work with the Secretary of the Interior to develop a rule that would effectively address National Park commercial air tourism overflights. While the agencies were subsequently able to complete Grand Canyon rulemaking in a timely fashion, careful consideration of the issues and the recent history of the overflights debate led the agencies to choose a new approach to the important and difficult challenge of regulating commercial air tourism over National Parks. In May 1997, the Department of Transportation and Department of the Interior jointly established the National Parks Overflights Working Group (NPOWG), with the objective of letting affected parties develop recommendations on a regulation that would fairly regulate the air tour industry while protecting park resources and National Park visitors.

This first-of-its-kind joint Federal advisory committee was convened from a group of private individuals with broad knowledge and experience in air tour operations, commercial air transportation, and general aviation—as well as in the policies, resources, and management of National Parks. Rotary and fixed-wing operations, and private pilot interests were represented within the group, as were National Park and local conservation perspectives, and the interests of Native Americans and tribal governments.

Specifically, NPOWG's task was to develop a recommended notice of proposed rulemaking that would define a process for reducing or preventing the adverse effects of commercial air tour operations over units of the National Park System.

National Parks Overflights Working Group Recommendation

Over the course of a year, the NPOWG achieved a consensus beyond what the agencies had thought possible. To a major extent, this was not the product of a mechanical compromise or deal-making. It was the product of long hours of analysis, deliberation, and debate on the fundamental principles and detailed procedures. Individual members approached the issues from widely varying perspectives and held different views on commercial activities, resource protection, and visitor experiences in National Parks. One thing that helped was that NPOWG made the conscious decision at the outset to conduct its deliberations in open meetings. Throughout a series of often difficult meetings, the group sought and accepted both technical information and counsel from many people, including private citizens and agency professionals within the Federal Aviation Administration and the National Park Service. Common ground grew from a willingness to openly communicate and honestly question positions and concerns. In the end, the members were able to establish a shared sense of reality regarding the management of air tourism over National Parks and agree upon a fair and workable approach.

In December 1997, the NPOWG recommended a process for regulating commercial air tourism over parks and subsequent Federal Aviation regulation. This recommendation was endorsed by both the National Park System Advisory Board and the Federal Aviation Administration Aviation Rulemaking Advisory Committee, which directed the Federal Aviation Administration to cooperate with the National Park Service in drafting a formal "Notice of Proposed Rulemaking" based on the NPOWG's recommended outline.

In constructing their recommendation, the NPOWG built around a set of fundamental agreements that the needed Federal Aviation Regulation should:

Be Process-Oriented—An effective regulatory framework should be based on principles that would apply system-wide, and practices that can be applied to all park units. Provisions, such as exemptions for the safe operation of aircraft on takeoffs and landings, should allow for differences in terrain, weather conditions, and authorized uses within a framework that also would provide appropriate protection of wilderness values and sensitive resources.

Protect Park Resources—The sounds of nature are among the intrinsic elements that combine to form the natural environment of parks. This "soundscape" is an inherent component of "the scenery, the natural and historic objects, and the wildlife" in some National Parks, and visitors to those parks ought to have the opportunity to enjoy quiet and the sounds of nature unimpaired in at least a portion of the park for at least part of their visit.

Be a Cooperative Process—The process should be a cooperative one because this is what would allow the two agencies to preserve their essential responsibilities intact. The Federal Aviation Administration could retain its role as the manager of America's airspace and its responsibility to ensure safety in the sky. The National Park Service could retain its responsibility and authority to protect park resources and values and visitor experiences.

Be a Planning Process—The process should be constructed, in part, as a planning process. After an air tour operator would apply to the Federal Aviation Administration to overfly a park, the National Park Service should determine the potential impacts to resources and visitors, and these should be addressed in the course of an air tour management planning process conducted by the two agencies. Agreements and environmental decision documents should be signed by both agencies. Consequently, this process could effectively combine publicly accountable planning procedures based on the National Environmental Policy Act, including full public participation in the development of alternatives and proposed actions.

Be Implemented by the Federal Aviation Administration—The agreements and decisions in the resulting Air Tour Management Plan should be implemented through Federal Aviation Administration issued "Operations Specifications," the standard tool for managing commercial air carriers.

Use Clearly Defined Management Tools—The regulation should provide clearly defined management tools that could be employed to prevent or reduce impacts where air tours exist or are determined to be appropriate.

Treat Visitors Equally—All National Park visitors, including flightseeing visitors, would be treated equally in this process. All visitor activities in National Parks must occur "in such manner and by such means" to prevent impairment of park resources and values and their enjoyment by others.

Affect Only Commercial Air Tour Operations—The process would only apply to commercial air tours, not general aviation, since air tour flights purposefully occur over parks, at lower altitudes, more frequently, and often at the same locations and attractions favored by ground-based visitors.

Be Fair to Air Tour Operators—The process should provide a means to significantly lessen or mitigate existing air tour operations and prevent unilateral expansion of air tour operations where they do not yet exist. It should not allow for a unilateral ban. Existing operations should continue under an interim operating authority while the two agencies develop a joint Air Tour Management Plan (ATMP). New air tour operations should not be authorized to start at other parks until an ATMP is completed.

Be Implemented Through Regulation and Legislation—Although this process should be based on a workable combination of recognized policies, procedures, and responsibilities within the National Park Service and Federal Aviation Administration, these agreements are so novel that questions may arise within the agencies and the public about the authority of the agencies to implement it. Consequently, the agencies should proceed with the development of a proposed rule and seek to have it adopted legislatively.

Reflecting these fundamental agreements, the core of the NPOWG recommendation (refer to appendix A of this article) is that commercial air tour operations would not be conducted over National Parks except in compliance with an ATMP developed jointly by the Federal Aviation Administration and the National Park Service. The ATMP, which would be approved by both agencies, would authorize, authorize with limits, or prohibit air tour operations over National Parks. The Federal Aviation Administration would implement the ATMP recommendations by issuing Operations Specifications to the air tour operator reflecting those agreements and decisions.

There is little doubt that the cooperative use and blending of agency authorities, policies, and procedures are very unique. And it has withstood intense scrutiny. The NPOWG recommendations are so strong and cohesive that the recommendation to implement through regulation and legislation has come to pass. Even as the Federal Aviation Administration has worked cooperatively with the National Park Service on the development of a proposed Federal Aviation Regulation, parallel legislation has passed both the U.S. House of Representatives and the U.S. Senate—a testament to the soundness of the recommendation and the integrity of the NPOWG members.

The Challenge of Implementation

Even the best ideas cannot survive poor implementation, and the Federal Aviation Administration, the National Park Service, air tour operators, the environmental community, and the general public face many challenges ahead. Some of the major challenges include:

1. How effective a working relationship can the Federal Aviation Administration and National Park Service build around this process? The Federal Aviation Administration will implement the regulation/law through their Western Regional Office in Los Angeles, while the National Park Service is likely to provide a park support office in Denver. Coordination between the agencies will be a major challenge, and getting the right mix of personnel in each office will be essential.
2. When the rule/law goes into effect in 1999, as many as 30 to 50 Air Tour Management Planning processes may be triggered. Despite Congressional interest in completing this process quickly, without a significant infusion of resources to the two agencies (unlikely), only a few Air Tour Management Plans will be completed each year. One of the first priorities of the two agencies will be to address the issue of how to schedule the ATMP process and how to set priorities in the context of this process. The success of the first few planning efforts will set the tenor for the remainder of the plans. The agencies will need to carefully select the first parks for ATMP completion, and close attention will be

needed from management and senior staff. It will be important to do this well in order to convert skeptics to believers.

3. Funding will be a significant challenge to both agencies because most of the funding and personnel are likely to come from existing resources. This will be especially challenging for small parks with very little budget to start with. Both agencies may need some supplemental resources, and that will be a challenge.

4. The agencies will need to address some important scientific challenges as well. What are the best, and least costly, methods of doing acoustic monitoring and modeling in low-noise environment parks? And because the new regulation/law requires that an acoustic standard(s) be set in parks based on an enormous range of possible park resource and visitor experience factors, how is this to be done in an acceptable manner?

5. And finally, how can air tour operators become more effective visitor service providers in National Parks? As these commercial interests engage the government, the public, and other interest groups in this process, they are likely to evolve into more responsive service providers. An important challenge will be to explore how the National Park Service and the Federal Aviation Administration can assist in this process.

Conclusions

The Federal Aviation Administration and the National Park Service have adopted a unique way to address the controversial issue of managing commercial air tourism over National Parks. The agencies chose to form a citizen advisory board comprised of the most affected parties to develop recommendations on a Federal Aviation Regulation for that purpose. The NPOWG has proven to be a great success, largely due to the extraordinary efforts of group members. The cooperative process they recommended skillfully blends the authorities and management practices of the two agencies into a process that all parties believe to be a fair and effective compromise. That these recommendations have been adopted by the agencies and by both Houses of Congress is testament to their practicality and fairness.

Implementation will be a challenging process in terms of cooperative administration, budget, priority setting, and science, but if successful, it will be a useful model to explore wherever this issue may arise around the world in parks and wildland areas.

Appendix A: Proposed Air Tour Management Plan Process

The detailed outline for the proposed Air Tour Managemnt Plan (ATMP) process incorporates the necessary steps to meet National Environmental Policy Act (NEPA) compliance requirements, fosters close cooperation and coordination between the Federal Aviation Administration and the National Park Service and with interested public, and incorporates relevant park planning and the recommended rule stipulations for air tour management plans.

Air Tour Operator Initiates Process

Existing Operations—Air tour operator requests to continue existing service via Interim Operating Authority.

- An air tour operator already operating commercial air tours within 0.5 mile outside the boundary of a park and below 5,000 feet above ground level over the park or less than 1 mile laterally from any geographic feature within the park may continue to do so provided that within 90 days after the effective date of the final rule (1) an air tour operator conducting air tours under Code of Federal Regulations (CFR) Part 91 applies for an operating certificate under Code of Federal Regulations (CFR) Part 119 or (2) an air tour operator conducting operations under Code of Federal Regulations (CFR) Part 121 or 135 applies for appropriate operations specifications. This triggers the initiation of an ATMP. The air tour operator would meet with the park superintendent and appropriate Federal Aviation Administration staff to develop an interim operating authority that embodies the existing service, as documented to Federal Aviation Administration and National Park Service satisfaction. Modifications to the interim operating authority may be made subsequently if the agencies agree that these modifications improve protection of park resources and values.
- The draft interim operating authority would be presented to the public for information and comment. Pertinent public comments would be considered in developing the final interim operating authority.
- An interim operating authority (a letter to the air tour operator signed by the park superintendent and the designated Federal Aviation Administration representative) that incorporates the agreed-upon operations and requirements (including any reporting requirements) would be issued to the air tour operator within 2 to 3 months. The interim operating authority would remain in place until the park's air tour management plan is developed and approved.
- An air tour operator conducting air tour operations under Code of Federal Regulations (CFR) Part 91, but not applying for an operating certificate under Code of Federal Regulations (CFR) Part 119, must meet the very limited exception described in the rule (no more than a combined total of five flights per 30-day period for all such operators), and must secure a letter of agreement signed by the Federal Aviation Administration and the park superintendent describing the conditions under which such flights will be conducted. This should be completed within 1 to 3 months.

New Operations—New air tour operator applies for Code of Federal Regulations (CFR) Part 135 Operations Specifications.

- A new air tour operator who desires to begin flying commercial air tours within 0.5 mile outside the boundary of a park and below 5,000 feet above ground level over the park or less than 1 mile laterally from any geographic feature within the park must apply to the Federal Aviation Administration for operations specifications.

- Federal Aviation Administration staff would notify the National Park Service that a formal proposal has been submitted by the air tour operator to conduct air tours over the park.
- A joint Federal Aviation Administration-National Park Service ATMP process would be initiated upon receipt of the aforementioned operator's completed application.

Air Tour Management Plan Process Started (1 to 2 months)

Conduct Internal Scoping Meeting—Appropriate Federal Aviation Administration staff and park superintendent would initiate the ATMP process by convening an internal scoping meeting(s) that includes the joint Federal Aviation Administration-National Park Service planning team. The purpose of the meeting(s) would be to agree on:

- The sufficiency of data (for example, aircraft operations data, noise or other impact data, visitor surveys, information on critical wildlife habitat and cultural resources) and the need for new or updated data.
- The relationship to other park plans, including the park's general management plan, resource management plan, and visitor services plan.
- Compliance—the NEPA process must be followed, including making a decision on whether to develop (1) an environmental assessment (EA) leading to either issuance of a finding of no significant impact or (2) the preparation of a notice of intent, draft environmental impact statement (EIS), final environmental impact statement, and record of decision.
- Interdisciplinary planning team composition—identify core members and consultants.
- Schedule.
- Public involvement approach—determine political and public situation and develop an appropriate public involvement strategy. How many public meetings should be held and where? Would news releases and newsletters be appropriate?
- Products—scoping letter, newsletter(s), alternatives workbook, environmental documents, draft and final air tour management plans.
- Scope of work—what are the parameters of the project? Will it entail one park or will two or more parks be included in the air tour management plan?
- Roles and responsibilities for Federal Aviation Administration staff, National Park Service staff (park and planning team), air tour operator(s), Native American tribe(s), if appropriate, and any other stakeholders (such as nearby or adjacent landowners).
- Costs for data acquisition, travel, salaries, and plan production.

Prepare Joint Federal Aviation and National Park Service Project Agreement—The Project Agreement would be a contract between the Federal Aviation Administration and various National Park Service offices and would include the aforementioned internal scoping meeting agreements (scope of work). The planning team leader would write the project agreement, and it would be approved by the park superintendent and the designated Federal Aviation Administration representative.

Public Scoping and Planning Orientation and Analysis Conducted (2 to 4 months)

Identify, Acquire, and Analyze Data—During the public scoping period, appropriate Federal Aviation Administration and National Park Service personnel (superintendent, park staff, and planning team members) would identify data needs and analyze data and/or initiate necessary research or procurement of required data (such as, ambient baseline sound levels, intrusive noise sources, visitor use, critical wildlife habitat, significant park resources, and wilderness). If extensive data were required, this planning phase could take longer than 2 to 4 months because data collection may need to be conducted at the peak tourist season when the impacts on park visitors would be expected to be the greatest.

Team Orientation Trip—Conduct joint Federal Aviation Administration and National Park Service planning team orientation trip to:

- Confirm park purpose and significance statements, management zoning, sensitive areas for wildlife, visitor experiences, Native American lands, etc., and how the proposed overflight(s) relate to them.
- Enhance team members' familiarity with the park resources and related issues and the overflight proposal(s), status, and air tour issues, including Federal Aviation Administration safety and operation concerns and Native American issues. If appropriate, the planning team would meet with Native American tribe(s) and any other stakeholders to discuss their concerns.

Initiate Public Scoping—The National Park Service planning team leader, in conjunction with the Federal Aviation Administration counterpart, would prepare and distribute a joint notice of intent in the "Federal Register" (if an Environmental Impact Statement is to be prepared) and a public scoping newsletter (may also post the newsletter on the Internet). The purpose of the notice of intent/newsletter would be to (1) inform the public about the overflight proposal(s), issues, process, and schedule, and (2) request comments on the scope of the plan and provide information on any scoping meetings. If significant historic resources might be affected by the plan, the State historic preservation office would be contacted and apprised of the situation, issues, and scope of the project. If significant natural resources might be affected by the plan (for example, threatened and endangered species), the U.S. Fish and Wildlife Service and the appropriate State wildlife agency would also be consulted. Ultimately, the primary purpose of public scoping is to assist in determining the range of issues to be addressed in the NEPA document.

Conduct Public Scoping Meetings—The joint planning team would then conduct public scoping meetings at a location(s) in or near the park and in the regional area. The purpose of the meetings would be to inform the public about the overflight proposal(s), issues, process, and schedule, and to obtain public comments.

Analyze Public Comments—Subsequent to the initial public scoping period, the joint planning team would analyze public comments and confirm or modify the ATMP scope of work accordingly.

Alternatives Developed (2 to 4 months)

Prepare Preliminary Alternatives—After public comments were obtained from the scoping publications and scoping meetings, the joint Federal Aviation Administration-National Park Service planning team would develop a preliminary set of alternatives that would cover a reasonable range of overflight options, including a no-action alternative.

Conduct Public Involvement—The joint planning team would then prepare and distribute a public alternatives workbook and/or conduct workshops on the draft alternatives at the park and in the regional area. If necessary, the State historic preservation office, the U.S. Fish and Wildlife Service, other appropriate Federal agencies, State and local governments, organizations, and individuals would also be involved in this stage of planning.

Analyze Public Involvement and Select a Proposed Action—Subsequently, the joint planning team would meet to analyze public comments on the workbook and/or alternative meetings. Planning team members would modify the preliminary alternatives according to pertinent public input and then select a proposed action. Modifications to the alternatives and selection of a proposed action would require agreement between the designated Federal Aviation Administration representative and the park superintendent.

Inform Agency Leaders—Senior planning team members from both agencies would brief their agency leadership on the selected proposed action. For the National Park Service, the planning team leader and the park superintendent would brief the regional director.

Draft Air Tour Management Plan/ Environmental Impact Statement or Environmental Assessment Prepared and Distributed (6 to 12 months)

Prepare Draft Plan—The joint planning team would prepare an air tour management plan/environmental assessment or a draft air tour management plan/environmental impact statement. The Federal Aviation Administration would be responsible for writing the air tour operations and safety sections of the plan, and the National Park Service would focus on the park-related components of the plan (including park visitor experiences and natural and cultural resources). The draft plan would then be distributed for Federal Aviation Administration and National Park Service internal review and analysis prior to submittal and request for comments by the air tour operator(s) and other stakeholders.

Review and Print Draft Plan—The joint planning team would meet and agree on the internal review comments to be incorporated in the document (the senior planning team members from each agency would need to concur on the changes). The draft plan would be printed and distributed (including via Internet if desired) to the public for review and comment.

Conduct Public Meetings—One or more public meetings on the draft plan would be held by the joint planning team as appropriate, depending on the issues, stakeholders, and level of public interest and controversy. Meetings would also be conducted with appropriate Federal, State, and local government officials.

Environmental Assessment or Environmental Impact Statement Process Completed

At this point in the process, there is need for completion of an Environmental Assessment or an Environmental Impact Statement. The following steps describe the differences:

For an Environmental Assessment, prepare and distribute a Finding of No Significant Impact (1 month).

If an Environmental Assessment has been prepared and the proposed action is determined to constitute a major Federal action that would significantly affect the human environment, a separate EIS process would be initiated. However, if it is determined that the proposed action in an Environmental Assessment would not constitute a major Federal action that significantly affects the quality of the human environment, a separate "Finding of No Significant Impact" would be prepared after the public review period (usually 30 days), signed by joint Federal Aviation Administration and National Park Service signatories, and distributed to the public. This would end the NEPA process for an Environmental Assessment.

OR

For an Environmental Impact Statement, prepare and distribute a Final Air Tour Management Plan/Environmental Impact Statement (5 to 7 months) and prepare a Record of Decision (1 month).

Analyze Public Comments—At the end of the public 60-day review period for the draft document, the joint planning team would meet and analyze the public comments. The senior members from each agency would agree on modifications to the document.

Prepare Final Plan—The joint Federal Aviation Administration-National Park Service planning team would then prepare a final Air Tour Management Plan/Environmental Impact Statement and distribute it for internal review as per the draft plan. The final Plan/Environmental Impact Statement would include responses to substantive comments on the draft plan received from agencies, organizations, Native American tribe(s), and the general public. It would also address monitoring and reporting requirements.

Review, Print, and Distribute Final Plan—The joint planning team would meet and agree on the internal review comments to be incorporated in the document (senior agency planning team members would need to concur on the changes). The final plan would be printed and distributed to the public

and appropriate government agencies for their information and comment (may also post on the Internet if desired).

Prepare a Record of Decision—At the end of a 30-day public "no action" period following distribution of the final Air Tour Management Plan/Environmental Impact Statement, the joint planning team would prepare a "Record of Decision" and distribute it for review (Federal Aviation Administration, National Park Service, air tour operator, Native American tribe(s), and any other stakeholders). The "Record of Decision" would include the rationale for the selection of an alternative as well as appropriate mitigation measures to minimize environmental harm.

Print and Distribute Record of Decision—Review comments would be incorporated into the "Record of Decision" (as agreed upon by the senior agency planning team members), signed by joint Federal Aviation Administration and National Park Service signatories, printed, and distributed to the public. This would end the NEPA requirements for the EIS process. (Time estimates provided for completion of each step in the process are based upon close coordination and communication between cooperating agencies and any necessary research being conducted quickly.)

Final Outcome

Federal aviation administration issues operations specifications (with or without limitations) for park flightseeing based on the Air Tour Management Plan, or denies air tours at the park unit.

Wilderness in an Urban Setting: Planning and Management of the Cape Peninsula National Park, Cape Town, South Africa

Maretha Shroyer
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Abstract—The Cape Peninsula National Park (CPNP) is unique because it is situated within the Cape Floristic Kingdom, one of the six floral kingdoms of the world, as well as within a metropolitan area with over 2.8 million people. A key challenge facing Park management is the management of the urban-wilderness interface in an open access system. Park management has adopted a number of proactive and complementary planning and management strategies to deal with urban-edge challenges. Specific initiatives have been developed and implemented to address natural hazards, development pressure, legislative shortcomings, and social problems. This paper shows that the long-term sustainability of the CPNP will depend on the ability of Park management to embrace the urban context.

The Cape Peninsula is situated on the southwestern corner of the Africa continent (fig. 1) and covers an area of approximately 471 km^2. This Peninsula is unique in that it lies at the heart of the Cape Floristic Kingdom, one of the six floral kingdoms in the world, as well as the Cape Metropolitan Area (CMA), a metropole of over 2.8 million people (Aberman 1997). The Cape Peninsula has a Mediterranean climate—wet in the winter (June to August) and dry and hot in the summer (November to February). However, the climatic conditions along the Cape Peninsula are dominated by the orographic influence of the mountainous peaks that run the length of the Peninsula. As a result, weather can change rapidly from sunny and clear to strong southeasterly winds with poor visibility.

The Cape Peninsula is recognized nationally and internationally as an area of outstanding natural beauty and unique biodiversity. More specifically, it contains the highest diversity of plant species (2,256), endemic plant species (90), and threatened species (141) of any similarly sized area on earth, making it one of the world's most significant conservation priorities (Environmental Evaluation Unit 1997). It is also treasured for unique opportunities for recreation, inspiration, and relaxation in an otherwise stressful urban environment (Fuggle and others 1994). However, the rapid growth of the CMA in recent years has intensified threats to this area's unique natural heritage.

In May 1998, 16,000 ha of public and private land was proclaimed as the Cape Peninsula National Park (CPNP). This was the first step in consolidating conservation and management of the natural areas of the Cape Peninsula under one managing authority, namely the South African National Parks (SANP). The CPNP includes vast tracts of fynbos (fine bush), pristine coast line, and mountainous landmarks such as Table Mountain, Lion's Head, Devil's Peak, the Twelve Apostles, Cape Point, and Boulders Beach (the site of a mainland colony of endemic Jackass Penguins).

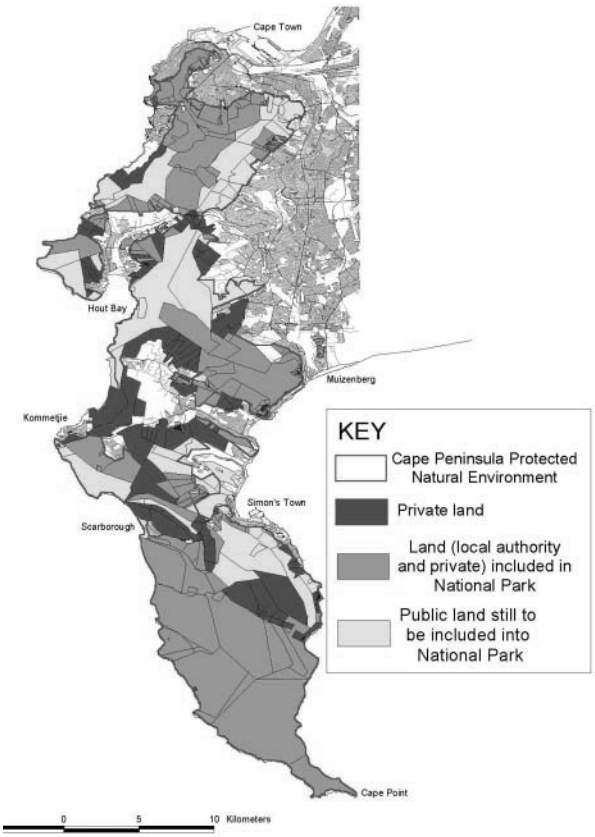

Figure 1—Map of the Cape Peninsula.

In: Watson, Alan E.; Aplet, Greg H.; Hendee, John C., comps. 2000. Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management, and allocation, volume II; 1998 October 24–29; Bangalore, India. Proc. RMRS-P-14. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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Many cultural and historic resources such as historic buildings, military features, places of archaeological significance, and religious sites are also found within the Park boundaries.

This paper will provide an overview of developments that preceded the proclamation of the CPNP. We will also highlight some general challenges and related initiatives facing Park management before expanding on specific issues arising from the Park's urban context. Finally, this paper will indicate how wilderness can be conserved in an urban setting through the use of management strategies underpinned by effective communication and active partnerships.

Developments Preceding the Proclamation of the Cape Peninsula National Park

Certain units of land in the Cape Peninsula have received some protection since the 17th century; however, significant events led to the establishment of the Cape Peninsula National Park (CPNP). Back in 1978, the Hey Commission recommended CPNP be established, and Table Mountain and the South Peninsula be proclaimed a nature reserve under the Nature Conservation Ordinance No. 19 of 1974, or by a special Act of Parliament.

In 1989, over 60 percent (or 291 km^2) of the Cape Peninsula was awarded some protection from development by the Environment Conservation Act 73 of 1989. This area was called the Cape Peninsula Protected Natural Environment (CPPNE). The creation of the CPPNE was a positive step; however, multiple ownership resulted in fragmented management of this biodiversity "hotspot."

In recognition of the need for proper management of the Cape Peninsula, the Administrator of the Cape Province commissioned a study in 1993 to determine policies for the management of the Cape Peninsula. A report entitled "Policy for the Multi-Purpose Use of the Cape Peninsula" was prepared by the Environmental Evaluation Unit of the University of Cape Town under the leadership of Professors Richard Fuggle, Roy Siegfried, and Dr. John Raimondo. The Fuggle report (1994) recommended that the CPPNE be managed by the South African National Parks (SANP).

In 1994, the Kahn Working Group recommended that should a statutory managing authority be established for the management of CPPNE, all the present responsibilities (of the existing management authorities) be reassigned and land reallocated to this statutory body.

A committee chaired by Professor Brian Huntley of the National Botanical Institute was appointed in 1995 by the Minister of Environmental Affairs. The Huntley Committee invited submissions from bodies interested in managing the CPPNE. After considering the submissions, the committee recommended that the SANP be appointed to take over the managerial custody of the area. In December 1995, the Provincial Government accepted this recommendation on the condition that the SANP make "significant progress" toward stewardship of the area by July 1996.

In January 1996, the Table Mountain Project Team was established by SANP and tasked to establish a National Park using the CPPNE as the core. This was satisfactorily achieved by the SANP. It took several months of intensive negotiations, carefully structured compromises and agreements between the SANP, different local, provincial, and national authorities, and over 200 private landowners before all agreed on a common vision—the formation of the proposed National Park. Negotiations were somewhat complicated by heated debates that took place between the SANP and some nongovernment organizations (NGO's), mainly because of a lack of trust on both sides.

Despite these obstacles, the first agreement was signed on April 29, 1998, between SANP and the City of Cape Town, the Cape Metropolitan Council, and the South Peninsula Municipality, effectively handing over the management of portions of land to SANP. On May 29, 1998, approximately 16,000 ha was officially proclaimed a National Park in the Government Gazette. Once the process of consolidation has been completed, the CPNP will ultimately cover some 30,000 ha under the management of SANP.

Strategic Planning of the Cape Peninsula National Park

The CPNP is not home to lions, buffalo, elephant, or any of the popular game species found in most other National Parks of South Africa. Rather, the principal attraction of the CPNP is its fantastic scenic views, 2,256 indigenous plant species (Bond and Goldblatt 1984) and associated avifauna, amphibians, reptiles, invertebrates, and small mammals. Appropriate conservation of fynbos ecosystems is extremely important because over 90 species are endemic to the Cape Peninsula (Trinder-Smith and others 1996), large numbers of species have become extinct, and 141 plant species are currently threatened.

In addition to the challenges associated with managing this biodiversity hotspot, the task of managing the CPNP is made more complex because it is located within the rapidly growing Cape Metropolitan Area, with open and easy access to local communities and visitors alike to undertake activities such as walking, picnicking, rock climbing, horse riding, paragliding, and mountain biking.

Park Establishment

Establishment of the terrestrial components of the CPNP is particularly important to ensure adequate protection of the high numbers of endemic and threatened fauna and flora. Having acquired the first portions of the CPPNE, Park management remains under pressure to incorporate further conservation-worthy portions of land. Negotiations are currently underway for the transfer of some conservation-worthy pieces of public and privately owned land into the CPNP. The process of obtaining land for inclusion into the CPNP makes use of a number of strategies. For instance, people can contract land into the CPNP voluntarily or via the use of nonpermanent tradeoff opportunities, or contract land into the Park with enhanced permanent rights for a portion of the property and cession to the state of the rest of the property.

During the 1990's, there has been increasing recognition of the importance of marine and coastal areas of the Cape Peninsula (Fuggle and others 1994). Currently, only 2 percent

(or 4 km) of the coastline of the Cape Peninsula is afforded total protection from exploitation in marine protected areas (MPA's) (Prochazka 1998). This is a serious state of affairs if one considers that the Cape Peninsula lies at the junction of two major southern African biogeographic provinces: the Cool Namaqua Province to the west and warmer Agulhas Province to the east, separated by Cape Point. The waters of the Agulhas Province are especially high in marine biodiversity and endemism (Brown 1997).

The challenge is for the SANP to explore ways whereby marine resources around the Cape Peninsula can receive adequate protection and management. A small portion of the funds, received from the Global Environmental Facility (GEF), are earmarked to undertake a feasibility study to investigate ways of transferring management of marine conservation-worthy areas abutting the CPNP from the South African Department of Sea Fisheries to the SANP.

Park Funding

The expenditure of the CPNP is approximately 25 million Rand (or $4.2 million) per annum. Without adequate funding, it will be impossible to manage the CPNP to the high standard required for such a globally important area. Both SANP and the various local and provincial authorities are facing a situation of limited financial resources and diminishing income. State subsidies also cannot be guaranteed.

Funds for the first 6 years have been secured from various sources. The former public landowners (City of Cape Town, South Peninsula Municipality, and Cape Metropolitan Council) have promised over 10 million Rand (about $1.6 million), the GEF 46 million Rand (or $7.7 million), and a French funding agency, the FFEM (Fonds Francais pour l'Environment Mondial), 6 million Rand (or $1 million). Income of approximately 12 million Rand is currently being generated from admission fees to reserves such as the Cape of Good Hope Nature Reserve, Boulders Coastal Park, and Silvermine Nature Reserve. Additional income is also derived from commercial companies that lease Park land, and for charging companies to use the Park to launch new products and to undertake commercial filming.

Increasing Tourism and Local Visitors

The Western Cape Province and the Cape Peninsula in particular are experiencing a rapid growth in tourism and this trend is likely to continue (CPNP 1998). It is significant that seven of the 10 most visited tourist destinations in South Africa are found in the Western Cape Province, three of these in the Cape Peninsula (Table Mountain Cableway, Cape Point, and Kirstenbosch National Botanical Gardens). If tourism grows at current levels, the Western Cape Province needs to accommodate 3.4 million visitors by the year 2000 and 9.3 million by 2010 (CPNP 1998). This increase in tourism as well as increasing numbers of local visitors is placing added pressure on Park facilities.

The Cape Peninsula National Park management has adopted an integrated approach, the gateway concept, to handle increasing numbers of visitors to the Park. The gateway concept aims to channel 90 percent of the visitors and their impacts to 2 percent of the Park in an attempt to meet the needs of visitors while preventing over-exploitation of the resource base of the Park. Approximately 15 gateways are envisaged (CPNP 1998). Each gateway will offer safe and secure parking, interpretive information, and at least three well-marked circular walking routes. At some gateways, infrastructure will be available ranging from public toilets, restaurants or refreshment outlets, formal and informal trading venues, environmental education centers, and eventually public transportation. An added benefit of gateways is that they will provide trading opportunities to local communities. This is important, as local communities need to receive tangible benefits from the Park if long-term conservation goals are to be realized.

To manage increasing numbers of recreational users, a use-zone map was developed according to ecological zones (MLH 1996). Specific strategies for each recreational user group, via working partnerships with these groups, have also been initiated. For example, management guidelines were developed by sport climbers in consultation with Park management to mitigate sport-climbing impacts. Corrective action (as required) will be undertaken jointly by SANP and the sport-climbing community.

Communication and Partnerships

Of particular importance in managing a wilderness in an urban context is the establishment of trust and working partnerships with all stakeholders, including local communities, NGO's, government authorities, original user groups, and the general public. The challenge facing Park management is to engender a sense of ownership among all inhabitants of the metropole and to establish sustainable working partnerships. Park management has attempted to achieve improved communication and partnerships in a number of ways:

- Two monthly meetings held with the Cape Peninsula National Parks Committee, appointed by the National Minister of Environmental Affairs and Tourism, to monitor and advise CPNP management on policy issues. These meetings serve as a forum for the public to raise issues relating to the CPNP.
- Contractual agreements, established with private landowners and local authorities, have served to forge better working partnerships aimed at addressing urban-edge issues.
- Partnerships have been formed with groups/organizations providing specialized skills, such as a rescue service provided by the Mountain Club of South Africa, together with the South African Air Force and the Ambulance Service (Metro), and using the "Theater for Africa" group to develop programs/plays for environmental education purposes.
- An NGO forum is held every 2 months at the regional offices of the SANP.
- Volunteer programs have been initiated with local conservation groups. The first volunteer wardens have already undergone training.
- Bilateral fora have been developed around specific issues.
- A web page, regular press releases, radio talk shows, and a variety of publications inform the public about developments in and around the Park.

Managing the Urban Edge

Old-style conservation practices—such as putting up fences to keep wild animals in and people out—have no place in the new South Africa, least of all in the CPNP. In fact, urban-edge neighbors have an important role to play in effective park management. Prior to the proclamation of the CPNP, wild areas of the Cape Peninsula (excluding the Cape of Good Hope Nature and Silvermine Nature Reserve) were freely accessed by all. The people of the CMA are adamant that free access to the CPNP, as enjoyed for many years, should continue.

The CPNP shares a common open boundary with four State bodies, a provincial authority, a metropolitan authority, two local authorities, and over 200 private landowners. This situation presents Park management with a range of challenges, including natural hazards such as fire, animals, boulders, flooding and alien vegetation; social and urban problems, such as squatting and development pressure; esthetics degradation; and inadequate legislative control. Park management has adopted innovative management initiatives to address these problems. Initiatives are underpinned by effective communication and working partnerships with urban neighbors.

Natural Hazards

Fire Management—Fire is critically important to the regeneration of fynbos (Richardson and others 1994). Frequent fires, however, are undesirable, and vegetation on the urban fringe is especially prone to fires through accidental and other means. Fires, whether controlled or wild, could pose a threat to fauna, flora, people, and property within and outside the CPNP. To manage fire in an urban context, CPNP management has adopted a number of management initiatives:

- A compartmentalized burning program that makes use of artificial burning to try and simulate the natural cycle is followed. In instances of wild fires, recently burnt areas will assist in containment.
- A variety of fire breaks are used on the urban edge to limit the spread of fire between Park and urban areas.
- The CPNP has entered into negotiations with local insurance companies to increase premiums for households on the boundary of the Park when landowners do not adopt measures to protect their properties against fires. Local authorities are supporting this initiative by writing conditions into the approval of building plans for housing developments on the boundary of the CPNP.
- To reduce the large volumes of highly flammable vegetation found on the urban edge, environmental education programs are informing neighboring landowners about fire risks and fire prevention methods.

Problem Animals—As a result of the open access between natural and urban zones, some animals move freely between the Park and the urban surroundings. Domestic cats catch birds in the Park, while mongoose, baboons, and porcupines move into adjoining urban areas. In some cases, baboons have been known to attack both adults and children and have sometimes been encountered in peoples' homes. A local metropolitan newspaper reported an incident where a baboon died of stress and exhaustion after a 2-day chase in suburban areas adjoining the CPNP (The Cape Argus 1996).

Specific tailor-made programs for the management of problem animals have been developed and are being implemented. Strategies to manage the baboon problem include:

- Use of baboon-proof dust bins.
- Establishment of a baboon task team consisting of the Society for the Protection and Care of Animals (SPCA), local authorities, and CPNP personnel.
- The removal of baboon sleeping sites close to the urban edge.
- Enforcing "no feeding of baboon" regulations.
- Patrolling boundaries to prevent baboons from leaving the Park.
- Trapping or darting rogue baboons and relocating them in the Park.
- Chasing baboons back into the Park.

Loose Boulders—The Cape Peninsula mountain chain consists of many weathered, rocky sandstone outcroppings and large boulders. Natural processes of weathering and erosion influence stability of soil and rock around boulders, sometimes resulting in boulders becoming mobile. Boulders can roll into neighboring landowners' property or public roads, causing injuries to people or damage to property. Recently, a Capetonian was badly injured by a rock fall while driving along Chapman's Peak Drive, a scenic road on the edge of the Park.

Park management has adopted a "no interference" approach to natural geomorphic processes except in instances where there has been human interference. As Park management does not accept responsibility for damage caused by rolling or falling boulders, they have initiated negotiations with insurance companies to increase premiums against damage in areas of high risk.

Flooding—Inappropriate planning and development control in certain areas abutting the Park has resulted in the construction of houses in 1:50-year flood plains. These areas are particularly at risk of flooding after the first rains of the winter season. Flooding is often exacerbated in instances where large tracts of land have been cleared of alien vegetation or after wild fires. Storm-water drainage systems in urban areas prone to flooding are often not designed to accommodate greater volumes of runoff. Park management attempts to limit flooding by:

- Reducing the size of areas cleared of alien vegetation on the urban edge.
- Using a compartmentalized fire management program.
- Negotiating with local authorities to upgrade storm water infrastructure.

Alien Vegetation—Fifty percent of the CPNP is under moderate to dense infestation by invasive alien plants, for example, *Acacia*, *Pinus*, *Eucalyptus*, *Sesbania*, and *Hakea*. Invasion by alien plant species has already resulted in the extinction of 26 plant species, and many other plant species are currently at risk (Bond and others 1992). To prevent alien vegetation from spreading into the Park, private landowners within and adjoining the CPNP are encouraged to plant indigenous vegetation. To further control the spread of

undesirable invasive vegetation, SANP has in the past proclaimed certain plant species as invasive weeds.

Social and Urban Problems

Squatting in the Park—High levels of unemployment and poverty in the CMA have contributed to increasing numbers of squatters in the CPNP. Once a piece of land has been occupied or settled, it becomes a long and costly process to remove illegal occupants because the law favors them. Authorities can only remove illegal occupants if they can provide alternative sites. This is very problematic as it is impossible to effectively patrol an open access park in search of illegal "visitors" who often enter the Park at night. Cooking fires used by squatters in the Park increase the risk of wild fires.

To discourage illegal occupation, old buildings have been locked and barred and water sources blocked in specific Park areas in an attempt to make it as uncomfortable as possible to live or "hideout" in the CPNP. Popular living caves are regularly inspected and belongings of illegal occupants removed. The local authorities in the CMA and SANP have initiated the development of a policy on squatter control.

Informal Settlements—Informal settlements neighboring the CPNP are expanding into the Park, with a consequent increase in the exploitation of natural resources and risk of fire. The Park has established partnerships with these communities in an attempt to empower them to improve their economic and social circumstances. This includes direct employment on a contractual basis in the Park, the provision of informal trading opportunities at gateways, environmental education programs, and skills training. To date, interaction with poor communities living on the edge of the Park in Ocean View and Masiphumelele has proven to be fairly successful.

Development Pressure—The scenic beauty of the Cape Peninsula continues to attract development. Urban-edge sites commanding outstanding views and vistas are especially sought by developers. Particularly controversial has been the proposal to develop a large tract of pristine land at Oudekraal on the slopes of Table Mountain overlooking the Atlantic seaboard (The Cape Argus 1998a). Oudekraal is symptomatic of the scale of development pressure threatening the integrity of the wilderness character of the Park in currently undeveloped areas.

To counter inappropriate formal urban development on the CPNP's boundaries, Park planners actively participate in local and regional planning to assure the aesthetic appeal of the Park and its surroundings are not compromised. Park management supports Integrated Environmental Management procedures (Department of Environment Affairs 1992) and contributes comments on Environmental Impact Assessments undertaken for development proposals in close proximity to the Park.

To control development pressure in the long term, the SANP aims to proclaim as much land as is possible into a Schedule 1 National Park. Negotiations with private landowners and authorities, based on contractual agreements, are currently taking place to incorporate more land into the CPNP.

Legislative Control

The South African National Parks Act 57 of 1976 was promulgated to conserve land in National Parks situated in rural or agricultural settings. This Act, therefore, provides inadequate legislative protection for National Parks located near expanding urban areas (Environmental Evaluation Unit 1995). In areas outside the CPNP, administration of land use and town planning ordinances remains under the jurisdiction of provincial and local government. South African National Parks has no regulatory control outside the boundaries of the CPNP, and the National Parks Act needs to be revised to address this limitation (Environmental Evaluation Unit 1997). Legal advisors have been appointed by the SANP head office to investigate ways in which the SANP can exert influence outside the CPNP.

Conclusion

It is evident from the discussion above that the CPNP is faced with a myriad of strategic challenges, including Park establishment, funding, and increasing tourism. Apart from the challenges associated with managing this biodiversity hotspot, the task of managing the CPNP is made more complex because it is located within the rapidly growing CMA.

Cape Peninsula National Park management has adopted a number of proactive and complementary planning and management strategies to deal with urban-edge challenges. Specific initiatives have been developed and implemented to address natural hazards, development pressure, legislative shortcomings, and social problems.

The success of these management initiatives and indeed the very existence of the CPNP are dependent on effective communication and working partnerships with local authorities, private landowners, communities living on the edge of the Park, volunteer groups, and NGOs. Ignoring these and other metropolitan stakeholders would undermine the continued consolidation and management of the CPNP. Urban-edge issues cannot be resolved without cooperation.

The protection of terrestrial and marine ecosystems in the Cape Peninsula will ultimately depend on whether the inhabitants of the CMA take ownership of this globally significant natural resource. Ultimately, the long-term sustainability of the CPNP will depend on the ability of Park management to embrace the urban context.

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A Comparison of Strategies for Rationing and Managing Use on Selected Rivers in the United States in 1986 and 1998

Randy T. Welsh

Abstract—River managers often rely on rationed use limits to control visitor impacts and manage increasing demand for river access. Characteristics of 19 river segments in the Western United States with rationed use limits in place during the 1998 floating season are examined and compared to those in place in 1986. Visitor use management on these rivers is described, including application procedures, fees, use limits, and regulations. Suggestions for river managers in other parts of the world are offered.

Recreational floatboating in the United States is very popular. Over 17 million people participated in rafting or kayaking in 1994 with an average of three trips per year (Cordell and others 1997). Managers at extremely popular rivers have adopted rationing and regulating floating use as one way to minimize resource impacts, crowding, and social conflicts.

There are several approaches used to ration river access (Stankey and Baden 1977; Shelby and Danley 1979; Shelby and others 1982). River managers most commonly use a two-step rationing process: (1) applications are accepted at the beginning of the year for a lottery drawing where launch dates are assigned according to the launch preferences submitted by prospective river runners, and (2) any unallocated days and cancellations are assigned on a first-come, first-served basis through phone call-ins. The remainder of river managers ration river access with a variety of first-come, first-served methods.

Welsh (1986) reviewed rationing systems for rivers in the Western United States where private noncommercial visitor access was controlled through a permit system. In 1986, 14 river segments were examined. This paper looks at what has changed in the last 12 years. On what new rivers have managers chosen to ration use? How have the permit systems and rationing processes changed in this period? What regulations and required equipment changed over time? This paper examines these questions and provides suggestions for the manager considering rationing visitor use and regulating river visitors.

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Methods

To determine what changes had occurred in the last 12 years, a list of river segments with permit requirements was established by consulting several published sources (Interagency Whitewater Committee 1992; American River Management Society 1992; Penny 1991). Additionally, an Internet search was performed to learn more about the management of these rivers and to discover new segments where rationing of permits was now occurring. From these sources, a list of approximately 25 candidate rivers was generated. A letter and short questionnaire were sent to managers of these rivers to request information about their current permitting process, use information, regulations, and rationing. Follow-up phone calls were made to each manager. A final list of 19 river segments was established where private noncommercial river recreation use is rationed.

Characteristics of 1998 Rationed Rivers

Rationed river segments are diverse in their physical and managerial characteristics. Table 1 identifies these segments and describes their location, managing agency, length, duration, and difficulty. Five segments are under 30 miles long and are considered day or overnight trips. Six segments range between 39 and 47 miles long and offer a 3- to 4-day excursion. Seven segments provide a 5- to 8-day float, varying from 75 to 104 miles. One segment, the Colorado River-Grand Canyon, in Arizona, is typically floated over nine to 30 days and is 277 miles long.

Eighteen of the rivers are managed by Federal agencies, including the USDA Forest Service (seven rivers), the USDI Bureau of Land Management (six rivers), the USDI National Park Service (four rivers), and the U.S. Bureau of Reclamation (one river). One segment is managed by the State of Montana.

These rivers offer a variety of recreational experiences, with four beginner river segments having little to no whitewater, 13 rivers with more advanced Class III-IV (International scale) whitewater rapids, and two rivers with a high degree of difficulty and Class IV-V+ technical whitewater strictly for expert river runners.

The time period for rationing on these rivers varies with each segment. All 19 rivers ration use during the peak high-use season, usually during the late spring/summer runoff months when there are suitable water flows for floating. Eleven rivers require permits year-round, with eight maintaining ration limits during the low use season. Actual river use varies by river and by the rationing mechanism applied.

Table 1—River description.

River	Segment name	Location	Agency	Length	Duration	Dificulty
				miles	*days*	*class*
Colorado	Black Canyon below Hoover Dam	Arizona-California border	Bureau of Reclamation	21	1-2	I-II (Easy)
Colorado	Cataract Canyon	Southeast Utah	USDI National Park Service	94	3-6	III-IV (Advanced)
Colorado	Grand Canyon	Northern Arizona	USDI National Park Service	277	10-30	III-IV (Advanced)
Colorado	Westwater Canyon	Southeast Utah	USDI Bureau of Land Management	17	1-2	II-III (Intermediate)
Green	Desolation/Gray Canyons	Central Utah	USDI Bureau of Land Management	84	6-7	II-III (Intermediate)
Green	Gates of Lodore - Dinosaur National Monument	Northeast Utah	USDI National Parks Service	45	3-4	III-IV (Advanced)
Kern	Forks of the Kern	Central California	USDA Forest Service	17	1-2	IV-V (Expert)
Rio Chama	Wild & Scenic section	Northern New Mexico	USDI Bureau of Land Management	30	1-2	II-III (Intermediate)
Rio Grande	Ute Mountain	Northern New Mexico	USDI Bureau of Land Management	20	2-3	I-II (Easy)
Rogue	Grave Creek to Foster Bar	Southwest Oregon	USDI Bureau of Land Management	40	3-4	III-IV (Advanced)
Salmon	Corn Creek to Long Tom Bar	Central Idaho	USDA Forest Service	79	5-6	II-III (Intermediate)
Salmon	Middle Fork in Frank Church-River of No Return Wilderness	Central Idaho	USDA Forest Service	98	5-6	III-IV (Advanced)
Salt	Upper Salt in Salt River Canyon Wilderness	Central Arizona	USDA Forest Service	32	3-4	III-IV (Advanced)
San Juan	Sand Island to Mexican Hat to Clay Hills	Southeast Utah	USDI Bureau of Land Management	104	1-5	I-II (Easy)
Selway	Magruder to Selway Falls in Selway-Bitterroot Wilderness	Central Idaho	USDA Forest Service	47	3-4	III-IV (Advanced)
Smith	Smith River Waterway	North Central Montana	State of Montana	59	4-6	I-II (Easy)
Snake	Hells Canyon	Idaho-Oregon border	USDA Forest Service	81	4-6	III-IV (Advanced)
Tuolumne	Wild & Scenic section	Central California	USDA Forest Service	18	1-3	IV-V (Expert)
Yampa	Dinosaur National Monument	Western Colorado	USDI National Park Service	72	3-4	III-IV (Advanced)

[1]International scale.

Twelve rivers limit launches-per-day and party size to control the number of people entering the river corridor. Limits on other rivers apply to number of people (one river), people per season (one river), and combinations of number of launches and people per day (five rivers). These limits affect both commercial and noncommercial floaters. Table 2 describes the control seasons and rationing limit used on each river. Total rationed river use in 1997 for these segments is displayed in table 3. Total use varies from a low of 536 floaters on the Selway River to an estimated 22,000 on the Colorado River-Grand Canyon.

1986 and 1998 Historical Comparison of Rationed Rivers

Since 1986, five rivers have had rationed limits placed on them, including the Colorado River-Black Canyon below Hoover Dam in Arizona, the Rio Chama and Rio Grande-Ute Mountain run (both in New Mexico), the Salt River in Arizona, and the Smith River in Montana. Four of these segments are typically easy floating (Class I-II) and are usually day trips or up to several nights. The Salt River is the exception, it is a 3- to 4-day trip with more advanced whitewater (Class III-IV).

Control Seasons

On the 14 other rationed rivers there were five major changes to controlled-use peak seasons. Three segments reduced their control season by 5 days on the Snake River, 15 days on the Tuolumne River, and 2 months on the Yampa River. These adjustments reflected drops in demand due to recurring low water. Two rivers extended their seasons by 1 month for the Colorado River-Westwater Canyon in the spring, and by 15 days in the spring and 1 month in the fall for the Rogue River. These extensions were because of increasing demand for use on the shoulder seasons for these segments.

Permit Allocation

In 1986, five rivers relied on first-come, first-served permit distribution (Colorado-Cataract, Kern Forks, San Juan, Snake, and Tuolumne), one had a waiting list and limited lottery (Colorado-Grand Canyon, with 2,500 people and a 5+ year wait), and the remainder used lotteries with subsequent call-ins for cancellations and unallocated launch dates. The Colorado-Westwater maintained a monthly lottery during the peak use season. By 1998, the San Juan and Snake Rivers had moved to a lottery system, while two new additions, the Colorado-Black Canyon and Rio Grande-Ute Mountain, had begun first-come, first-served queues. The Colorado-Grand Canyon still maintains a waiting list (which has grown to 6,800 people with a 12+ year wait). All other rivers are using a lottery to initially distribute launch dates and then a call-in for cancellations and unassigned dates. Three rivers also maintain a waiting list for launch dates once the initial drawing is held: Green-Desolation/Gray, San Juan, Colorado-Westwater (to be eliminated on all three rivers in 1999).

Application Process

The application process could only be described as chaotic for the private floater in 1986. For those segments with lotteries, each river had a separate and unique application process with different start and stop dates, application formats, and submission requirements. Application deadlines were at various times between December and February. Rivers with first-come, first-served queues had open application periods. By 1998, two major shifts had occurred: (1) two groups of rivers had joined together to offer joint application procedures for their lottery and (2) launch application deadlines had been standardized at either January 31 or February 1 among Federally managed rivers with lotteries. Table 4 displays the 1998 permit application procedures for the 19 river segments.

Beginning in 1987, four Idaho rivers—the Snake, Main Salmon, Middle Fork Salmon, and Selway, all managed by the U.S. Forest Service—developed a central reservation process. Realizing that floaters on these rivers were often the same pool of applicants, they formed an alliance to reduce their administrative costs for managing a lottery. In their system, applicants were allowed up to four launch date choices assigned to one or more rivers. This was thought to give applicants the opportunity to choose their preference for a river trip while at the same time reducing the total number of requested launch dates across the four river segments. In a similar combination in 1989, three rivers—the Colorado-Westwater, the Green-Desolation/Gray, and the San Juan, all managed by the U.S. Bureau of Land Management in southeastern Utah—merged their application processes, although each still maintains a separate lottery.

All rivers still administer independent call-in procedures with somewhat more consistent, though still variable, dates. The Idaho rivers have unpublished call-in dates after their lottery in mid-February, while the three Utah Bureau of Land Management rivers use March 1. The remaining rivers with lotteries have call-in dates ranging from February 18 to May 1. Rivers with first-come, first-served reservations have open call-ins. Table 5 compares application and call-in dates between 1986 and 1998.

A slight surprise was that the number of launch choices floaters were able to submit increased on six river segments while staying the same on the remaining eight rivers. Choices range from one to four with the exception of the Colorado-Grand Canyon, which each year offers the top 300 people on their waiting list 15 or more launch choices, up from 10 in 1986. In an effort to minimize cancellations and provide more time to fill open launch slots, nine managers have opted to move confirmation dates forward from those in 1986, typically from mid-March until at least 4 weeks in advance of launch. No clear trend exists for cancellation dates with four moving forward, five staying the same, and three moving closer to the actual launch.

Fees

In what may be biggest change between 1986 and 1998, the charging of application and permit fees has grown significantly. Only one river charged an application fee—the

Table 2—River rationing limits—1998 use season.

River	Segment	Control season[a]	Launches per day[b]	People per day	Peopleper season	Party size
Colorado	Black Canyon below Hoover Dam	All year	30 craft total			30
Colorado	Cataract Canyon	All year; high use: April 15-Oct. 15			8,000	40
Colorado	Grand Canyon	All year; high use: April 16-Oct. 15. Must be on wait list to call-in	High use:1 per day with 2 on Wed; low use: 1 every 3rd day			16
Colorado	Westwater Canyon	All year; fees: April 1-Oct. 31; high use: May 1-Sept. 30	5 p, 4 c	75 p, 75 c		25
Green	Desolation/Gray Canyons	All year; fees: March 1-Oct. 31; high use: May 15-Aug. 15	High use: 3 c, 3 p, low use: 1 c, 1 p			25
Green	Gates of Lodore-Dinosaur National Monument	All year; high use: 2nd Mon. May-2nd Fri. in Sept.	4-6 total: shared with Yampa 300 p per yr			25
Kern	Forks of the Kern	May 15-Sept. 15	1 c per day	15 p		15
Rio Chama	Wild & scenic section	High use: May 1 to June 6; release weekends (FS) July 17-to Aug. 29	High use: 16 p per week, 5 c; release: 24 p,10 c per week			16
Rio Grande	Ute Mountain	June 1-March 31		1 t per day		16
Rogue	Grave Creek to Foster Bar	All year; high use: May 15-Oct. 15		120 t		20
Salmon	Corn Creek to Long Tom Bar	June 20-Sept. 7	4 p, 4 c; 320 p per season			30
Salmon	Middle Fork in Frank Church-River of No Return Wilderness	All year; high use: June 1-Sept. 3	7 t; ratio varies per day			24
Salt	Upper Salt in Salt River Canyon Wilderness	March 1-May 15	4 p, 2 c per day	45 p, 30 c per day		15
San Juan	Sand Island to Mexican Hat to Clay Hills	All year; fees: March 1-October 31; high use: all year	6 t SI; 3 t MH	65 t SI; 35 t MH		25
Selway	Magruder to Selway Falls in Selway-Bitterroot Wilderness	May 15-July 31	1 t per day; 62 p, 16 c per season			16
Smith	Smith River Waterway	All year; high use: June 10-July 10	9 t per day; 8p-1c; high use: 7 p, 2 c on Wed/Sun			15
Snake	Hells Canyon	All year; high use: Friday prior to Memorial Day-Sept. 10	2 c, 3 p; 345 p per season			24
Tuolumne	Wild & Scenic section	May 1-Sept. 30	2 c of 26 people each	90 p, 142 t		26
Yampa	Dinosaur National Monument	All year; high use: 2nd Monday May-July 14; low use after July 15	4-6 t; shared with Green			25

[a]All year = permits required year-round; fee = period when fees are charged; high use = period when permits are rationed.
[b]c = commercial allocation; p = private allocation; t = total allocation; SI = Sand Island; MH = Mexican Hat.

Table 3—1997 River use data.

River	Segment	Trips	People
Colorado	Black Canyon below Hoover Dam	3,000	7,364
Colorado	Cataract Canyon	624	6,733
Colorado	Grand Canyon	827	22,000
Colorado	Westwater Canyon	1,484	13,102
Green	Desolation/Gray Canyons	624	6,081
Green	Gates of Lodore-Dinosaur National Monument	1,004	14,718
Kern	Forks of the Kern	50	750
Rio Chama	Wild & Scenic section	263	1,768
Rio Grande	Ute Mountain	18	76
Rogue	Grave Creek to Foster Bar	1,789	13,819
Salmon	Corn Creek to Long Tom Bar	460	6,147
Salmon	Middle Fork in Frank Church-River of No Return Wilderness	705	10,836
Salt	Upper Salt in Salt River Canyon Wilderness	300	3,000
San Juan	Sand Island to Mexican Hat to Clay Hills	1,440	12,836
Selway	Magruder to Selway Falls in Selway-Bitterroot Wilderness	54	563
Smith	Smith River Waterway	743	4,771
Snake	Hells Canyon	315	4,015
Tuolumne	Wild & Scenic section	752	6,900
Yampa	Dinosaur National Monument	1,004	14,718

Rogue ($2) in 1986. Four rivers—the Rogue, Colorado-Westwater, Green-Desolation/Gray, and San Juan, all managed by the Bureau of Land Management—required a permit fee, which varied from $2.50 to $7.50 per person. All fees had to be paid by personal check, money order, or cashier's check. By 1998, rivers with application fees had grown to 13 with fees ranging from $2 to $100, while 12 rivers had permit fees, eight with per-person fees from $5 to $20, and four rivers with flat fees from $25 to $75 (Table 6). In addition, other fees may apply, such as tribal land use fees (Salt and San Juan Rivers), nightly impact fees (Colorado-Grand Canyon), and nonresident fees (Smith). Of those rivers requiring fees, seven will accept credit card payments in addition to checks and money orders. All fees are nonrefundable across all agencies.

Changes in fee collections are due to increases in fee authority for Federally managed rivers. All three Federal agencies have had authority to collect fees to cover administrative costs of managing permit programs through the Land and Water Conservation Act of 1965. While the permit fee authority has existed with the Bureau of Land Management for many years, expansion of permit fee authority has only recently been granted to the National Park Service and Forest Service with the passage of the "Recreation Fee Demonstration Program" (Omnibus Consolidated Recisions and Appropriations Act of 1996 - Public Law 104-134). All four National Park rivers had taken advantage of this fee authority prior to 1998, while three Forest Service rivers (Kern, Main Salmon, Middle Fork Salmon) will not institute new permit fees until 1999.

Regulations

The mix of regulated behaviors and required items each float party must take on rationed rivers has increased since 1986. Requirements for fire pans and portable toilets have increased from 11 to 13 and from 7 to 12, respectively, among the original 14 rivers. Of the five new rivers, three require fire pans and two require portable toilets. Managers use these requirements to minimize impacts from campfire ring construction, firewood gathering, and charcoal buildup on beaches, and human waste sanitation concerns, from the large numbers of people concentrated in the river corridors. An additional two rivers, over the original five, require food strainers to reduce greywater contamination from dishwashing and food preparation tasks. Other safety requirements for life jackets, spare equipment, first aid kits, repair kits, bailing devices, and throw lines all saw small increases in their required use on these rivers. A requirement for air pumps was dropped from one river segment (Colorado-Cataract Canyon). Safety equipment requirements seem most dependent on agency policy and coordination with state boating laws. Table 7 displays the list of requirements by river in 1998. There were no changes in the restriction on use of motors or in the assigning of campsites.

Penalties

Managers use a variety of penalties to reduce abuse of the application process for rationed permits. Penalties are applied for failing to cancel within prescribed time limits and for failing to use assigned launch dates. These penalties have stayed fairly constant over the years for those rivers with lotteries. Twelve rivers currently have cancellation and no-show policies that eliminate that trip leader from consideration for future launch dates for 1 to 2 years. Since 1986, only two rivers have dropped these policies.

Future of Permit Rationing

Managers of the 19 rivers were asked about satisfaction with their current permitting systems. Fifteen stated they

Table 4—River permit application process 1998.

River	Segment name	Application start	Application finish	Application method	Launch choices	Rationing method	Lottery date	Call-in date
Colorado	Black Canyon below Hoover Dam	Open	Open	Mail, phone, fax, or in person	1	First-come, first-served	None	None
Colorado	Cataract Canyon	Open	Open	Mail or fax	1	First-come, first-served	None	Open
Colorado	Grand Canyon	1 Feb.	28 Feb.	Mail	15	Wait list	None	1st workday in Jan.
Colorado	Westwater Canyon	Dec.	1 Feb.	Mail	3	Lottery w/call in	Mid Feb.	1 Mar.
Green	Desolation/Gray Canyons	Dec.	1 Feb.	Mail	3	Lottery w/call in wait list	Mid Feb.	1 Mar.
Green	Gates of Lodore-Dinosaur National Monument	1 Nov.	1 Feb.	Mail	1	Lottery w/call in	Mid Feb.	1 Mar.
Kern	Forks of the Kern	15 Mar.	15 Apr.	Mail or in person	3	Lottery w/call in	Late Apr.	15 May
Rio Chama	Wild & Scenic section	1 Dec.	1 Feb.	Mail	3	Lottery w/call in	Mid Feb.	1 May
Rio Grande	Ute Mountain	Open	Open	Mail or phone	1	First-come, first-served	None	None
Rogue	Grave Creek to Foster Bar	1 Dec.	31 Jan.	Mail or fax	1	Lottery w/call in	Feb.-Mar.	1 Apr.
Salmon	Corn Creek to Long Tom Bar	1 Dec.	31 Jan.	Mail	4	Lottery w/call in	Mid Feb.	Mid Feb.
Salmon	Middle Fork in Frank Church River of No Return Wilderness	1 Dec.	31 Jan.	Mail	4	Lottery w/call in	Mid Feb.	Mid Feb.
Salt	Upper Salt in Salt River Canyon Wilderness	1 Dec.	31 Jan.	Mail or in person	3	Lottery w/call in	Early Feb.	15 Feb.
San Juan	Sand Island to Mexican Hat to Clay Hills	1 Dec.	1 Feb.	Mail	3	Lottery w/call in	Mid Feb.	1 Mar.
Selway	Magruder to Selway Falls in Selway Bitterroot Wilderness	1 Dec.	31 Jan.	Mail	4	Lottery w/call in	Mid Feb.	Mid Feb.
Smith	Smith River Waterway	Jan.	17 Feb.	Mail	3	Lottery w/call in	Mid Feb.	18 Feb.
Snake	Hells Canyon	1 Dec.	31 Jan.	Mail	4	Lottery w/call in	Mid Feb.	Mid Feb.
Tuolumne	Wild & Scenic section	1 Jan.	Open	Mail	2	First-come, first-served	None	1 Jan.
Yampa	Dinosaur National Monument	1 Nov.	1 Feb.	Mail	1	Lottery w/call in	Mid Feb.	1 Mar.

Table 5—Comparison of key river permit application variables 1986 and 1998[a].

River	Segment name	Application finish 1986	Application finish 1998	Launch choices 1986	Launch choices 1998	Call-in date 1986	Call-in date 1998
Colorado	Black Canyon below Hoover Dam	NA	Open	NA	1	NA	None
Colorado	Cataract Canyon	Open	Open	1	1	15 June	Open
Colorado	Grand Canyon	28 Feb.	28 Feb.	10	15	1 Jan.	1 Jan.
Colorado	Westwater Canyon	Open	1 Feb.	3	3	After lottery	1 Mar.
Green	Desolation/Gray Canyons	1 Mar.	1 Feb.	3	3	After lottery	1 Mar.
Green	Gates of Lodore-Dinosaur National Monument	15 Jan.	1 Feb.	1	1	15 Mar.	1 Mar.
Kern	Forks of the Kern	Open	15 Apr.	1	3	None	15 May
Rio Chama	Wild & Scenic section	NA	1 Feb.	NA	3	NA	1 May
Rio Grande	Ute Mountain	NA	Open	NA	1	NA	None
Rogue	Grave Creek to Foster Bar	14 Feb.	31 Jan.	1	1	1 Apr.	1 Apr.
Salmon	Corn Creek to Long Tom Bar	31 Jan.	31 Jan.	3	4	2nd Monday after 15 Apr.	Mid Feb.
Salmon	Middle Fork in Frank Church River of No Return Wilderness	31 Jan.	31 Jan.	1	4	After lottery	Mid Feb.
Salt	Upper Salt in Salt River Canyon Wilderness	NA	31 Jan.	NA	3	NA	15 Feb.
San Juan	Sand Island to Mexican Hat to Clay Hills	Open	1 Feb.	3	3	Open	1 Mar.
Selway	Magruder to Selway Falls in Selway Bitterroot Wilderness	31 Jan.	31 Jan.	4	4	15 May	Mid Feb.
Smith	Smith River Waterway	NA	17 Feb.	NA	3	NA	18 Feb.
Snake	Hells Canyon	Open	31 Jan.	1	4	Open	Mid Feb.
Tuolumne	Wild & Scenic section	Open	Open	1	2	Open	1 Jan.
Yampa	Dinosaur National Monument	15 Jan.	1 Feb.	1	1	15 Mar.	1 Mar.

[a]NA = not applicable, river did not have rationing in 1986.

were satisfied, while three were not satisfied and would change the systems in the near future. Only one manager was not satisfied, but had no immediate plans to change. In contrast, at least six of these same river segments are now in a planning process that may result in some change to rationing limits. At least three new river segments are also contemplating placing rationed use limits in the near future: Rio Grande-Taos Corridor (proposed for 1999), South Fork American (in progress), and Rio Grande-Big Bend (begins in 2000). The Snake-Hells Canyon completed a plan in 1997 that provided for 3 days every other week designated exclusively for nonmotorized floating. Previously, jet boats had been allowed on some river portions at all times. Clearly, management planning on these and other river segments is dynamic.

Rationed permits will continue to be a favored mechanism to control visitor use. In a recent study (Watson and others 1998) on the Middle Fork Salmon, both commercial and noncommercial floaters had strong opposition to increasing daily launch limits (80.6 and 76.1 percent).

Information about rationed rivers is also undergoing rapid change. With the advent of the Internet, new distribution channels for disseminating permit information to prospective floaters have been created. Most rivers managed by the National Park Service and the Bureau of Land Management have web sites dedicated to providing river permitting information. Only three of the Forest Service-managed rivers have comparable sites.

Permitting processes have achieved a level of maturity, and with the exception of possibly contracting future application and lottery mechanisms, should be considered stable. There is still potential for more centralization of river permit reservations. Areas to be explored include reducing call-in workloads, complete standardization of application procedures for those rivers with lotteries, limiting application choices between rivers to reduce contingency applications and subsequent cancellations and no-shows, and providing for a diverse spectrum of recreation opportunities within regional boundaries while managing across agency jurisdictions.

Table 6—1988 river permit fees.

River	Segment	Application fees	Permit fees	Other fees
Colorado	Black Canyon below Hoover Dam	$0	$5 per person	
Colorado	Cataract Canyon	$0	$25	
Colorado	Grand Canyon	$100	$50: 1 person $100:2-5 people $200: 5-16 people	$10 per person entry fee; $4 per person per night use impact fee; $25 per year continuing interest fee (elimintated for 1999)
Colorado	Westwater Canyon	$0	$7 per person	
Green	Desolation/Gray Canyons	$0	$18 per person	
Green	Gates of Lodore-Dinosaur National Monument	$12	$75	$25 overlength fee for extra days above 4 on Green; 6 on Yampa
Kern	Forks of the Kern	$2	$0	Fee demo in 1999
Rio Chama	Wild & Scenic section	$6	$5 per person	
Rio Grande	Ute Mountain	$0	$0	
Rogue	Grave Creek to Foster Bar	$5	$20 per person	
Salmon	Corn Creek to Long Tom Bar	$6	$0	
Salmon	Middle Fork in Frank Church-River of No Return Wilderness	$6	$0	
Salt	Upper Salt in Salt River Canyon Wilderness	$10	$5 per person	White Mountain Apache Tribe permit, $15 for river mile 60 to 31
San Juan	Sand Island to Mexican Hat to Clay Hills	$0	$6 SI-MH; $12 MH-CH; $18 SI-CH [a]	Permits required for use on Navajo lands on south bank (river left)
Selway	Magruder to Selway Falls in Selway-Bitterroot Wilderness	$6	$0	
Smith	Smith River Waterway	$5	$15 residents; $35 nonresidents per person	One day permit fee submitted with application; $15 resident, $35 nonresident; in addition to $5 drawing fee
Snake	Hells Canyon	$6	$0	
Tuolumne	Wild & Scenic section	$15	$0	$15 application fee for first 10 people, additional people $2 each
Yampa	Dinosaur National Monument	$12	$75	$25 overlength fee for extra days above 4 on Green; 6 on Yampa

[a] SI = Sand Island; MH = Mexican Hat; CH = Clay Hills.

Suggestions for Managers of Nonrationed Rivers

As demand for floating opportunities increases, more rivers may face pressure to move to rationed use limits. Managers are encouraged to begin planning. Creating baseline inventories of resource and social conditions can give valuable insight to developing trends. Establishing appropriate limits of acceptable change standards and indicators will provide reference indicators and triggers for when rationed use limits may be needed (Stankey and others 1985). Consider the role of your particular river in the spectrum of river recreation opportunities provided within a regional area. This will help tailor the management regulations needed for your particular program (Clark and Stankey 1979; Shelby and others 1990).

Push to establish use limits for both commercial and noncommercial users sooner rather than later. Many managers have found their efforts to curtail escalating use hampered by existing outfitters and users who feel threatened with a change to their use patterns. Negotiated rationed use levels almost always default to existing or higher than current use levels. By placing limits early in the management of a river segment, use levels can be kept more in balance with resource and social conditions before long-lasting impacts can occur. Upward adjustments to use levels are always possible if the river conditions warrant such increases, but downward use level changes are often highly controversial and subject to political intervention.

Create a consistent set of regulations within a regional area and consider applying the full set of regulations to all rivers even if there is not a current need. Many of the regulations on current rationed rivers are common sense safety requirements that most river floaters will easily abide by. Other requirements for fire pans and portable toilets will eventually become necessary as use levels increase and as

Table 7—River regulations.[a]

River	Segment	Fire pans	Porta potty	Life jackets	Spare jacket/ paddle	First aid kit	Repair kits	Spray skits/ flotation	Food strainer	Helmets	Bailing device	Air pump	Throw line	Signal device	Raft size	Assigned campsites	Motors
Colorado	Black Canyon below Hoover Dam			x													a
Colorado	Cataract Canyon	x	x	x	x	x					x	x	x	x			a
Colorado	Grand Canyon	x	x	x	x	x	x					x		x			a
Colorado	Westwater Canyon	x	x	x	x	x	x				x	x	x			x	a
Green	Desolation/Gray Canyons	x	x	x	x	x	x				x	x	x				a
Green	Gates of Lodore - Dinosaur National Monument	x	x	x	x	x	x	x	x	x	x	x			>11' long, 5' wide	x	
Kern	Forks of the Kern	x	x	x													
Rio Chama	Wild & Scenic section	x	x	x	x	x	x		x		x		x				
Rio Grande	Ute Mountain	x		x		x	x				x						
Rogue	Grave Creek to Foster Bar	x		x													a
Salmon	Corn Creek to Long Tom Bar	x	x						x								a
Salmon	Middle Fork in Frank Church-River of No Return Wilderness	x	x	x	x	x	x		x							x	
Salt	Upper Salt in Salt River Canyon Wilderness	x	x														
San Juan	Sand Island to Mexican Hat to Clay Hills	x	x	x	x	x	x				x	x	x				a
Selway	Magruder to Selway Falls in Selway-Bitterroot Wilderness																
Smith	Smith River Waterway			x												x	
Snake	Hells Canyon	x	x														a
Tuolumne	Wild & Scenic section	x	x	x	x	x	x		x	x		x	x				
Yampa	Dinosaur National Monument	x	x	x	x	x	x	x	x	x	x	x			>11' long, 5' wide		

[a]x = required; a = allowed.

impacts surface within river corridors to prevent degradation of river environments. Maintaining consistent regulations in a broad regional area will help ensure overall compliance by reducing confusion about what is required within any one area.

Consider the role of fees within your river program. Rationed river managers depend on these fees to pay for the costs of maintaining a rationed permit process. Permit fees can help offset costs of river management and administration and provide scarce funds for river improvement projects. Users have generally accepted application and use fees if set at moderate levels and if the money is used to aid the river program.

Finally, develop your permit systems with the user in mind. Create application materials and methods that make it easy for the floater to obtain all needed information and submit requests. While some managers prefer to make the process difficult in order to weed out potential applicants, there is a responsibility to protect the interests of the user. Balance administrative costs of your permit system against the convenience and responsiveness of the process to the user.

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II. Understanding and Protecting Biodiversity

Congress delegates from the United States and Denmark at the poster session in the Hotel Ashok (photo by Alan Watson).

The Hotel Ashok in Mysore, India, represented a different era of tourist accommodations (photo by Alan Watson).

Changing Paradigms in Wilderness Ecology: A View of Academia from Outside

Matthias Diemer

Abstract—In the past, wilderness ecologists concerned themselves primarily with the enumeration and description of organisms and their interactions in the natural environment. Within ecology more emphasis was placed on experimental approaches, often combined with greatly simplified model systems. Recently, this preoccupation has been challenged, both from within the biological sciences and from society as a whole. Wilderness ecologists are faced with changing societal perceptions of natural areas and the roles of biologists. They are increasingly challenged by society to voice their appraisals of global environmental problems, which commonly involve complex biological, as well as political and philosophical, issues. While biological issues may be competently addressed, wilderness ecologists, particularly from within academia, are at best ill equipped to address the latter. Various approaches have been advanced to address this dilemma, some of which focus on reforms within the existing (educational) system. Others, more fundamental, involve changes in paradigms: Wilderness ecologists are prompted to realize themselves as part of nature, thereby relinquishing objectivity. To what extent this new "softer" ecology will still resemble current ecological research is uncertain. Since it is unlikely that the continuation of a purely mechanistic understanding of nature will suffice in addressing current and future environmental changes, alternatives, including possible new paradigms, should be explored.

As with many ecologists (Ingensiep 1997; Futuyma 1998), an affection for nature was the major impetus for me to study ecology. Extensive fieldwork in the alpine further influenced my perceptions and conceptions of myself and nature. Yet in the course of my career, my preoccupation with data, conferences, and publications tended to suppress these experiences (see also Ingensiep 1997). My current involvement with experimental ecology (in managed nonwilderness landscapes) and new perspectives of wilderness through experiential education have revitalized these conceptions. With an "outside" view of wilderness ecology (thematically removed from wilderness within ecology), I began to question the current state of ecology, as well as the relationship between ecological science and nature. This led to an interest in historical and philosophical aspects of ecology. My paper is a first and by no means inclusive attempt (1) to grasp historical and current trends in wilderness ecology, (2) to interpret them from an ecological and philosophical perspective, and (3) to suggest possible future directions.

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What is Wilderness Ecology?

I define wilderness ecology as biological research in natural areas largely unmodified by humans. Obviously, wilderness ecology involves field-based research in natural places. Among wilderness ecologists within academia, research in environments largely undisturbed by humans is perceived to be particularly well suited for deriving underlying ecological principles (see also Leopold 1949). In contrast to more applied wilderness research institutions, university-based wilderness ecology uses primarily a descriptive/comparative approach, sometimes termed "natural history." This does not imply that wilderness ecologists do not conduct experiments; however, these are strongly constrained by the wilderness setting (the presence or absence of organisms, their particular distributions, and the occurrence of environmental gradients) as well as external (management) restrictions.

Origins of Wilderness Ecology

To begin with, I want to briefly examine the origins of wilderness ecology, with emphasis on brevity rather than comprehensiveness. Although a number of lineages can be identified, most, if not all, of these can be traced back to the writings of Alexander von Humboldt (1769-1859) and Charles Darwin (1809-1882). Aside from the unquestionable scientific merits, it is the thematic breadth that sets the work of von Humboldt and Darwin apart from 19th and certainly 20th century natural science. Both were naturalists in the sense that they concerned themselves with all aspects of nature, namely, botany, zoology, geology, or astronomy and their interrelationships. Although their theories were derived primarily from observation, particularly Darwin conducted experiments. A. von Humboldt can also be regarded as a philosopher and historian who integrated these topics into his perception of nature.

Two outstanding modern exponents who perpetuated this thematic breadth were the ethologist Konrad Lorenz (1903-1989) and the naturalist Aldo Leopold (1887-1948). Konrad Lorenz is best known for his studies on imprinting in birds, but also concerned himself with human psychology and philosophy. One major criticism of his work was that he relinquished objectivity in his famous study of the grey goose (*Anser anser*) (Ingensiep 1997). Yet as Ingensiep (1997) aptly put it, while Lorenz attempted to learn "goose language" our present day anthropocentric approach is to teach a chimpanzee to use human language.

Aldo Leopold was a wildlife ecologist who is perhaps best known for his book, "Sand County Almanac" (Leopold 1949). In his essay, "The Land Ethic," Leopold provides an ecological-evolutionary based environmental ethic that is considered valid even today (Callicott 1996), with the incorporation of recent ecological developments. Three points seem

particularly important to me with respect to wilderness ecology: (1) Leopold emphasizes our kinship with all organisms, (2) he argues that the evolution of a land ethic is both an intellectual and an emotional process, and (3) he calls for more ecological education, although he stresses that "an understanding of ecology does not necessarily originate in courses bearing ecological labels."

Present Trends in Wilderness Ecology

Current mainstream ecology seems to differ appreciably from the approaches and perceptions of von Humboldt, Darwin, Lorenz, and Leopold. Thematic breadth and the perception of being a part of nature seem to have given way to reductionism and anthropocentrism. In my present field, biodiversity, Naeem and Li (1997) have published an important paper about using artificial microcosms to experimentally verify that species-rich communities have higher reliability than depauperate communities. Surprisingly, despite its apparent artificialness, this experiment is one of the few pieces of evidence supporting the diversity/stability hypothesis. To my knowledge, this hypothesis has never been tested in natural settings. The approach of Naeem and Li (and its success), as well as similar studies, suggest that in many instances underlying ecological principles can only be tested using highly simplified and controlled conditions, yet efforts to derive general ecological theories from experiments have been for the most part futile (Weiner 1995).

This reductionism is not entirely due to experimental constraints. A second motive is related to an economic paradigm that has found wide acceptance in science, namely the valuation of science through numbers and quality of publications (see also Ingensiep 1997). My experience from Europe and the United States indicates that, as in other fields, the "publish or perish" syndrome is alive and well in all fields of ecology. We are made to believe that impact factors and publication lists are objective measures of scientific productivity. Consequently, highly productive scientists are rewarded with grants and promotions. An undesirable side effect of this development is that research is driven by the likelihood of publishable results, rather than curiosity or genuine interest in nature. This (emotional) detachment from the study of objects is in fact desirable, since one of the tenets of science is objectivity; however, science is by no means as objective as it pretends to be.

Where do these current developments leave wilderness ecologists? Obviously we are also subject to publication pressures, yet at a disadvantage since our approach (and study objects) does not lend itself to the reductionism pursued in mainstream ecology. Furthermore, the descriptive/comparative approach inherent in field ecology is looked down upon by the growing majority of ecologists who pursue the experimental/manipulative route. In the pecking order of ecology, field ecologists (termed "naturalists" by Futuyma) occupy the lowest position (Futuyma 1998). However, as early as 1974, Passmore proposed a re-evaluation of this status quo (Valsangiacomo 1998). Support has been provided by the current concern for biodiversity loss and conservation issues (Futuyma 1998; Noss 1997) and by J. Weiner (1995) who maintains that "most of the major advances in ecology have been made by scientists with either an extensive background in field natural history or at least a very large treasure of biological knowledge in their heads." Nevertheless, wilderness ecologists find themselves in the dilemma of either attempting to join the mainstream ecological bandwagon or carrying on in relative obscurity.

A brief exploit into the philosophy of nature: how ecologist-philosophers perceive this dichotomy—In 17th and 18th century Europe, natural science was closely linked with religious beliefs as scientists attempted to discover or document the inherent diversity and order of God's creation (Valsangiacomo 1998; Wilber 1998). Throughout the 19th century, these perceptions slowly changed, leading to a paradigm shift that coincided with the acceptance of Darwin's ideas in the sciences in the 1870's (Valsangiacomo 1998). Evolution as a mechanism driving speciation and extinction displaced creationism. Concurrently, a divergence occurred between what Valsangiacomo (1998) terms "natural science" and "natural history." "Natural history" uses a descriptive (observational)/comparative approach, and as inherent in its title involves a historical perspective. "Natural science," on the other hand, is in a sense historical, hence theoretical, and relies on an experimental/manipulative approach. According to Valsangiacomo (1998) "natural science," which, aside from mainstream ecology, also encompasses physiology, molecular biology, and genetics, relies primarily on experimental/manipulative methodologies. This approach necessitates reduction or abstraction to reduce the complexity of interactions and interrelationships inherent in nature. In their extreme forms, reductionism leads to laboratory microcosms, whereas abstraction leads to cybernetic representations of communities and the biosphere. Furthermore, abstraction places ecology in the vicinity of "pure sciences," such as physics, and by association may assume a mechanistic or deterministic functioning of nature.

Other authors have termed this natural "science/history" dichotomy "functional" and "evolutionary" biology (Mayr 1991), whereas Begon and others (1990) refer to these approaches as attempts to discover "proximate" (functional) and "ultimate" (evolutionary) causes. Weiner (1995), in his assessment of the state of ecology, acknowledges a "centrifugal force" separating what he terms "theoreticians" from "empiricists." I will use the terms "wilderness (or field) ecology" and "mainstream ecology" because Valsangiacomo's usage of "natural history" and "natural science" carries the connotation that natural history is "unscientific." Some mainstream ecologists (and philosophers) may however agree with this connotation.

As we have seen, wilderness ecology stands somewhat isolated from mainstream ecology. This isolation is due to historical developments, but also to current trends prevalent in academia. However, wilderness ecology is not merely an academic discipline, rather it also figures prominently in societal concerns for the environment.

Societal Demands on Wilderness Ecologists

The two most relevant challenges for wilderness ecology arise from (1) human-caused global environmental changes and (2) issues pertaining to wilderness use and management.

The Ecological Crisis

It is generally agreed that human-induced environmental changes are not merely a concern for the future; they are presently occurring. Aside from atmospheric changes (climate change, CO_2 rise), which are global, the oceans and land area have been impacted by human activities to a great extent. Vitousek and others (1997) estimate that up to 50 percent of the Earth's land surface has been transformed by human action. Media attention to global environmental changes and associated losses in biodiversity has raised public awareness of the biological sciences. Concurrently, there is a growing public belief, fostered by scientists, that science (including ecology) may provide solutions for mitigating environmental impacts if underlying effects are known.

Widely diverging estimates of future rises in sea level, ranging from scenarios of widespread coastal flooding (associated with extensive melting of polar ice sheets) to current estimates of little or no change despite global temperature increases of 2 to 3 ^{o}C, have provoked scepticism over the validity of such prognoses by scientists and many nonscientists. The failure of science to resolve such fundamental questions, combined with the spectacular failure of other high-profile prognoses (for example, the proposed large-scale forest dieback of Europe and the potential effects of warming or elevated CO_2 on plant communities) casts real doubt on the ability of purely technocratic approaches to address the abatement and reduction of environmental impacts. These approaches are likely to fail because (1) underlying principles are poorly understood and (2) current research paradigms are unsuitable (for example, "scaling," and reliance on models). Attempts to extrapolate from results of experimental plot studies to natural communities seem at best highly unrealistic, but many ecologists studying the effects of elevated CO_2 in the 1980's, including myself (Körner and Diemer 1994), committed this fallacy—and others may do so in the future. Furthermore, it is unlikely that the stereotypic cry for further data (and funding) will lead to a comprehensive understanding of immediate and long-term effects of human impacts on the Earth. This is due to the inherent complexity of organisms and their interrelationships among themselves and their environment. I do not imply, as some deep ecologists might, that current climate-change research should be stopped, but I am concerned by the inherent optimism suggesting that once the underlying mechanistic principles of an ecosystem are known, we will be able to manipulate (reconstitute or cure) it.

The roles and contributions of wilderness ecologists (from academia) that are most commonly associated with global environmental changes concern biodiversity and conservation biology. In fact, "natural history" may see somewhat of a resurgence, since skills in identifying organisms are in demand, particularly within the currently booming field of biodiversity research and perhaps in rare plant conservation (see also Noss 1997). An additional, hitherto undervalued, skill is a genuine grasp of not only the organisms, but their environment, phylogeny, diversity, and "idiosyncracies" (Futuyma 1998).

A number of naturalists are also directly involved in global change research. Some of them may feel a certain disillusion, as I did, because infrastructure and experimental constraints demand more attention than the object of study, or because they perceive the model systems employed to be too simplistic or reduced. Others may feel uncomfortable with "delivering the goods" in the form of short-term results, greatly simplified model parameters, or extrapolations.

While many wilderness ecologists are successfully involved in global change research, others are ill equipped, incapable, or unwilling to provide the remedies to ecosystem health expected by society. A part of the problem is the fact that all "remedies" involve complex political and ethical decisions. Questions such as "How much biodiversity is desirable?" actually lie outside the realm of natural science because as G. E. Moore has pointed out (Birnbacher 1991), morals or ethical decisions cannot be derived from nature (the so-called naturalistic fallacy). Thus, ethically, a eutrophicated lake with two algal species is no better or worse than an intact lowland rain forest. I do not mean to imply that wilderness ecologists should not concern themselves with these issues. But we must be aware of inherent value judgments masked by "scientific objectivity."

A second exploit into the philosophy of nature: how objective is natural science?—In the 18th and 19th centuries, humans were perceived as parts of nature and, along with inanimate objects, members of the "great chain of being" (Valsangiacomo 1998). As we saw above, this belief in a higher order was displaced by an evolutionary paradigm during the latter part of the 19th century, giving rise to an experimental/manipulative approach. Inherent in this new approach was an emotional detachment from the former study subjects to objects of study. Objectivity and empirical evidence became the most fundamental assumptions of science. Although the methodologies employed by naturalists and natural scientists alike may be objective, the motives leading to scientific questions (and research projects) certainly are not. Hence, according to Meyer-Abich (1997), natural science certainly is not as objective as it pretends to be. This criticism undermines the credibility of science, since scientists are not the detached observers that they pretend to be. Consequently, Meyer-Abich postulates an inevitable paradigm change within natural science, which in some ways related to the 19th century notion that perceived humans (including scientists) as integral parts of nature.

Although the logic may differ, this paradigm change has also been suggested by Leopold (1949) in his "kinship with nature" argument, as well as by various post-modernist movements, including deep ecology and ecofeminism. Wilber (1998) severely criticizes these "new paradigms," because by attempting to infuse science with holism or spirituality one commits a category error. Since empiricism (and reductionism) is fundamental to science, the proposed paradigm change in effect eradicates science. According to Wilber (1998), it is not the scientific method that "constitutes the disaster of modernity," but the fact "that all higher modes of knowing have been brutally collapsed into nomological and empirical science." He suggests that natural science should expand from narrow "sensory" empiricism to a broader form, incorporating all forms of experience (including morals and spirituality). Yet it is unclear to me how his "deep science" with a unifying approach to matter, morals, and spirituality can be practically realized. Furthermore, I am doubtful how (and when) it will address the current problems of wilderness and mainstream ecology. So as we can see, although philosophers acknowledge that all is not well with natural science, Meyer-Abich and Wilber diverge fundamentally about the causes and the necessary remedies.

Utility of Wilderness

The second major challenge for wilderness ecologists concerns wilderness. It is widely known that wilderness and seminatural areas serve a number of consumptive and nonconsumptive human uses. Aside from the use of resources (timber and game) they are important for esthetics, recreation, and education. Leopold (1949) also advocates a utility of wilderness for science, serving as a norm to judge ecosystem health.

Wilderness also has an important role in shaping human behavior. This assumption forms the basis of experiential education, which originated from K. Hahn (Heckmair and Michl 1998; see also contributions by J. Hendee, K. Russell and others, this proceedings). Gaard (1997), a leading ecofeminist, reaches a similar conclusion:

> ... if a wilderness orientation alters human perceptions of nature and culture, it may also alter human conceptions of appropriate ways of structuring the relationship between culture and nature, and through these conceptions, it may alter behaviors as well.

Hence, wilderness is important in shaping human identity.

In a sense, the relationship between humans and wilderness needs to be redefined: Do we protect wilderness from humans or do we permit interactions between humans and wilderness? (Today it seems obvious that we need not protect humans from wilderness.) Should these interactions be restricted spatially or temporally, or rather, as Gaard (1997) suggests, should wilderness areas be expanded to suit human needs? As mentioned above, these decisions are political, and as Gaard (1997) points out, ethical as well.

Wilderness ecologists, both from academia and particularly from more applied research institutions (governmental agencies and non-governmental organizations), play an important role in evaluating acceptable limits to wilderness use, presently and in the future. Yet, the definition of limits of acceptable change (LAC) and ethical decisions concerning the preservation of endangered species are important premises that lie outside the realm of "natural science," but rather with society or social science. It is the role of wilderness ecology to inform, monitor, and manage societal requirements of wilderness. Wilderness ecologists may perceive this new redefined role as a "subjugation" to society, social science, and ethics; and similar to colleagues within global environmental change research, they may well become disillusioned about their work. Hence it is time to look ahead for possible remedies.

"Muddling Through" or in Search of "New Paradigms"

Before we can attempt to examine possible solutions to the present dilemma, let's first recapitulate the problems: There is a general tendency within mainstream ecology toward reductionism with an emphasis on frequent and rapid dissemination of results (publication pressure), which involve the extrapolation of results of greatly simplified and controlled experiments to higher orders of complexity and diversity. These trends run counter to the natural history approach pursued by most wilderness ecologists, which involves a comprehensive view of organisms, their evolutionary history, and environmental setting.

These difficulties become even more severe in the light of human-caused environmental changes, which demand remedies that are often beyond the scope of ecology. Similar problems arise with respect to the appropriate use of wilderness. As we saw, purely scientific answers are insufficient for solving ethical questions. So, let's examine three possible responses:

1. Muddling through—This response is in effect no response, rather it is the attempt to carry on and to hope that somehow the situation will get better. In fact, there is evidence that at least the status of natural history within natural science may improve. Recently, the evolutionary ecologist D. Futuyma (1998) examined preconceptions of naturalists in the United States, as well as the important contributions of naturalists to modern evolutionary theory. Like Noss (1997), he emphasized the need for increased emphasis on natural history in university education and a broadened perspective comprising both descriptive and reductionist approaches. He concludes: "In fact, perhaps the 'ologist' (that is, natural historian) best has the opportunity or the need to integrate the biological sciences" (Futuyma 1998).

Weiner (1995) proposes that increased communication between natural history and ecology is not sufficient, rather he advocates a fusion of the two, meaning "... individual ecologists should attempt to be both theoreticians and empiricists."

How this fusion will come about and to what extent the fundamental differences between experimental/manipulative (mainstream ecology) and descriptive/comparative approaches (natural history) can be resolved is unclear. Futuyma's and Weiner's ideas have initiated a discussion among ecologists, which is also one of my primary objectives here. However, while these discussions within ecology may facilitate contacts and reduce tensions, they will not alleviate what I perceive to be fundamental problems.

> **A final exploit into the philosophy of nature: how can natural science change?**—As we saw above, philosophers of nature widely disagree about the causes and remedies of what they perceive to be the crisis of natural science. One central argument is that the detachment of humans from nature is the cause of many human-induced environmental problems. Natural science, with its dogma of objectivity, indirectly contributes to this exploitation of nature (Meyer-Abich 1997). How can we be expected to preserve nature if we lack concern and compassion?
>
> Nearly 50 years ago Aldo Leopold (1949) wrote: "It is a century now since Darwin gave us the first glimpse of the origin of species. We know now…that men are only fellow-voyagers with other creatures in the odyssey of evolution. This new knowledge should have given us…a sense of kinship with fellow-creatures; a wish to live and let live; a sense of wonder over the magnitude and duration of the biotic enterprise."

But how do we attain this kinship? I will attempt to classify the suggestions according to whether they can be realized within the existing system or whether they require a new approach to natural science (new paradigm).

2. Reformation from within—In agreement with Leopold (1949), Ingensiep (1997) mandates a reformed natural science, which perceives humans (and scientists) as an integral part of nature. To facilitate this view, he has made the following three practical suggestions: (1) intensification of contacts between scientists and nonscientists, (2) interdisciplinary sabbaticals, and (3) interdisciplinary science education, which includes the history of natural science and ethics. Some of the problems that wilderness ecologists are facing stem from historical developments, such as the split between natural history and natural science (Valsangiacomo 1998). Furthermore, wilderness ecologists are increasingly confronted with ethical questions and are ill prepared to address them. These difficulties could be alleviated through the institutional changes proposed by Ingensiep (1997). In fact, at least in Europe, there have been real efforts to foster interdisciplinarity in environmental science research and, as Ingensiep (1997) has pointed out, these contacts can serve as a forum for wilderness and mainstream ecologists (as well as for physiologists, geneticists, and biochemists) to become exposed to social, ethical, and philosophical concepts.

Yet it is doubtful that institutional changes will influence personal convictions. My view (albeit external) of the interpersonal dealings within one of the interdisciplinary projects mentioned above certainly serves as no basis for optimism. However, there is no a-priori requirement that we have to extend the questionable "objectivity/criterion" of science into our perceptions of culture and nature. For example, Allendorf (1997) advocates the incorporation of the Buddhist concept of mindfulness into conservation biology. In effect, various religious and esoteric practices aimed at overcoming the human/nature dichotomy may be equally suitable for attaining this conviction.

3. New paradigms—As Wilber (1998) pointed out, many of the postmodernist "new paradigm" movements (including deep ecology and ecofeminism in their extreme forms) are, in essence, nihilistic and anti-scientific (see also Weiner 1995). Their objective is not a scientific revolution (that is, paradigm change as defined by Kuhn [1962]), but rather the abolition of natural science.

The most plausible new paradigm is Meyer-Abich's (1997) notion of "Mit-Wissenschaft," which implies a natural science instilled by the personal convictions about our kinship with nature. It is difficult to predict which topics this new ecology ("softer" by current standards) in the line of von Humboldt, Darwin, Leopold, and Lorenz will pursue, and which methodologies it will utilize. I suspect one major difference will be the motivation: Rather than primarily by funding or by publication potential, it will be driven by genuine concern and curiosity for nature. Realization of this paradigm will certainly not be easy; however, because it is based on personal beliefs, it has the potential to become somewhat of a grass-roots revolution.

Postscript

Although I attempted to use the term "paradigm" in the sense of Kuhn (1962), I certainly failed by the rigorous definitions of Wilber (1998). And although I agree that it is a buzz-word or even "at present a dead metaphor" (Wilber 1998), I can think of no suitable alternative (which once established would likely suffer a similar fate).

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Restoration of Natural Fire to United States Wilderness Areas

David J. Parsons

Abstract—The restoration of fire to its natural role in wilderness has proven to be a significant challenge to the United States Federal wilderness management agencies. Although both natural (lightning) ignitions and management-ignited fires have been generally accepted as appropriate wilderness management tools, the implementation of wilderness fire management programs has been incomplete and inconsistent. Program constraints and consequent emphasis on fire suppression have limited accomplishments to date. The fact that even the most successful wilderness fire management programs have been largely unable to restore presettlement fire regimes raises serious questions about future program needs and priorities. Issues and challenges in need of attention are identified.

The traditional view of fire, as a force to be eliminated from wildland ecosystems, has been largely replaced with a recognition of the important role of natural fire in sustaining healthy native ecosystems. Yet, the restoration of fire to its natural role presents a significant challenge to United States wilderness management agencies. Following nearly a century of aggressive fire suppression, wilderness managers in the Bureau of Land Management, Fish and Wildlife Service, National Park Service, and Forest Service are now struggling with how best to restore fire to at least a semblance of its natural role. This struggle involves questions of policy, public perception, management, and science. In this paper, I review the status and accomplishments of the wilderness fire management programs of the four United States wilderness management agencies. I specifically address the challenges facing efforts to restore natural fire to United States wilderness areas.

Background

From its inception in the latter half of the 19th century, park and wilderness management in the United States has emphasized the protection of scenery and recreational opportunities (Graber 1995; Sellars 1997). This strategy has been likened to museum curation, with an emphasis on the protection of desirable vignettes of primitive America. It failed to recognize the importance of ecosystems as dynamic entities, dependent upon natural ecological processes that constantly change the landscape. Fire was considered an enemy, a destroyer of wilderness resources and values, including animals, vegetation, and scenery. The elimination of fire was considered essential to the protection of park and wilderness values. This thinking was largely consistent with the understanding of ecosystems as static entities that characterized ecological thinking of the times (Christensen 1995).

Passage of the United States Wilderness Act in 1964, codified the protection of "an enduring resource of wilderness" to be "protected and managed so as to preserve its natural conditions." Wilderness was to be managed so as to be "affected primarily by the forces of nature." Yet, although some observers had recognized the role of fire as an important "force of nature" decades earlier (Chapman 1912; Weaver 1943), the 1964 Wilderness Act only addressed the need for "the control of fire." Early wilderness policies of the four Federal wilderness management agencies mirrored this concern.

The latter decades of the 20th century have seen widespread recognition of the importance of fire and the effects of fire exclusion on natural ecosystems. The elimination of fire has been recognized as a cause of increasingly hazardous fuel accumulations and shifts in vegetative cover and succession that threaten to change the very nature of many native ecosystems (Brown and others 1995; Kilgore 1987; Leopold and others 1963). This understanding has led to a shift in the emphasis of wilderness fire management from fire exclusion to restoring fire to its presettlement role (Parsons and Botti 1996). Although fire exclusion is now recognized as one of the leading threats to the preservation of wilderness ecosystems (Cole and Landres 1996), acceptance of the use of fire as a management tool has been difficult. Despite the fact that current management policies of the United States wilderness agencies recognize the importance of fire as a natural ecosystem process, implementation of wilderness fire management programs is lagging and has varied greatly among the agencies.

Wilderness Fire Management

Wilderness fire management may include: permitting natural ignitions to burn (fires traditionally called prescribed natural fires, or PNF's—beginning in 1998, terminology was changed to "wildland fires managed for resource benefits;" however, in this paper I use the traditional terminology of PNF; the use of management ignitions (traditionally called management ignited prescribed fires, or MIPF's); and the suppression of unwanted fires. Natural

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fires (PNF's) that are permitted to burn only when specific, prescribed, conditions are met, are generally accepted as the preferred means for restoring fire in wilderness. Management ignitions (MIPF's) are most often used to accomplish specific objectives, such as fuel reduction, habitat improvement, or simulation of the effects of natural fire where lightning ignitions cannot do the job (Brown 1992; Mutch 1995). Management ignitions are often controversial because they are seen by some as human-caused intrusions in wilderness. Suppression remains the preferred option in those cases where the use of PNF or MIPF may cause unacceptable social or economic risks, or resource damage. Continued suppression of fire in areas adapted to periodic burning generally leads to increasingly hazardous fuel accumulations and loss of natural vegetative patterns (Christensen 1995), conditions that, in turn, only increase the dilemma of how to manage fire as a natural process.

In 1988, extensive fires (including some that started as PNF's but were later declared wildfires) burned more than 1.5 million hectares (3,706,500 acres) throughout the Western United States. These fires had a significant and immediate impact on the wilderness fire programs of the Federal agencies. All wilderness fire plans were suspended as an interagency Fire Management Policy Review Team reviewed program objectives and implementation. Although this review endorsed the major policy objectives, it also recommended changes in implementation strategies. No PNF's were permitted, and few MIPF's were conducted in 1989. Increased operational constraints resulting from the review limited the re-establishment of PNF programs, in part, by limiting those fires permitted to burn to situations where risks to social and natural values were minimal (Botti and Nichols 1995; Parsons and Landres 1998). Such restrictions are likely to eliminate those fires that would have the greatest ecological effect. Even a 1990 United States General Accounting Office Report (U.S. General Accounting Office 1990), criticizing the limited progress in restarting the prescribed fire program, seems to have had little impact. Despite concerted efforts to cooperate in the implementation of new coordinated wildland fire management policies (Glickman and Babbitt 1995), each of the wilderness management agencies continues to largely pursue their individual approaches and strategies for managing wilderness fire.

National Park Service

The National Park Service first formally acknowledged the detrimental effects of fire exclusion on natural ecosystems by recognizing fire as a natural process in its 1968 policy revision (van Wagtendonk 1991). Later that year, two lightning fires were permitted to burn and a 600 hectare (1,485 acres) prescribed burn (MIPF) was carried out in the subalpine forest of California's Kings Canyon National Park (Parsons and van Wagtendonk 1996). These actions initiated the first natural fire management program in the United States. By 1988, 26 National Parks had operational prescribed natural fire programs (so called because lightning ignitions were only permitted to burn under prescribed conditions). Interestingly, this is the same number of parks that had approved PNF programs in 1997. In contrast, the number of parks using prescribed fire (MIPF's), the number of fires, and the acreage burned by them has continued to expand in recent years (Botti and Nichols 1995).

As of 1997, 26 National Parks had approved PNF programs (this excludes the Alaskan wilderness parks that use a limited suppression strategy). These programs included 17 of the 36 parks (excluding Alaska) with designated wilderness, meaning nine nonwilderness parks also use the PNF strategy, while 19 wilderness parks do not use PNF's.

Sixty-two parks conducted MIPF's during either 1996 or 1997, including all of the 17 wilderness parks that have PNF programs. National Park Service policy approves the use of MIPF's for the "protection and preservation of wilderness character and resources," and the use of management ignitions is widespread within the agency, including within designated wilderness (Botti and Nichols 1995).

The National Park Service maintains the most complete fire records of the Federal wilderness agencies, including by year since inception of the program in 1968, the number of fires and total area burned by fire type (PNF, MIPF, or wildfire) for each unit in the system. Unfortunately, NPS fire records do not distinguish between wilderness and nonwilderness lands, a practice reflecting both the fact that many large natural area parks have never received Congressional designation as wilderness (such as, Glacier and Yellowstone National Parks), and a general perception by some NPS managers that wilderness designation is an unnecessary duplication of the agency's mission as expressed in the 1916 Organic Act (Sellars 1997). Because PNF programs are limited to large natural area parks that the NPS manages essentially as wilderness, I have included all National Park Service PNF programs in my analyses. The lack of distinction between wilderness and nonwilderness areas in the fire records presents a more serious problem for MIPF's because many of these prescribed fires occur in or around developed areas that are likely not to be designated wilderness or on lands that do not contain wilderness characteristics.

The area burned by natural fires in National Parks since the inception of the PNF program in 1968, shows a gradual increase through 1988, followed by a dramatic decrease (fig. 1). A reduction by over 50 percent of the mean number of PNF's per year since 1988 (154 PNF's per year in the 5 years prior to 1988 and 71 per year between 1993 and 1997), further dramatizes the effects of the post-1988 constraints on the wilderness fire program of the Park Service. Because PNF's are the preferred means of restoring fire to wilderness, this failure to recover to pre-1988 burning accomplishments is of great concern. Comparison of area burned by PNF's to that which fire history records (Swetnam 1993) indicate would need to be burned to approximate presettlement fire frequencies, suggest that even the pre-1988 fire management accomplishments were well short of that required (Parsons 1995; van Wagtendonk 1995). The lack of clarity (wilderness versus nonwilderness) in the MIPF records makes it difficult to evaluate the extent to which prescribed burns may have made up for the lack of PNF's. No effort has been made to evaluate differences in intensities or ecological effects of those fires that have occurred in recent years, compared to those that burned under presettlement conditions.

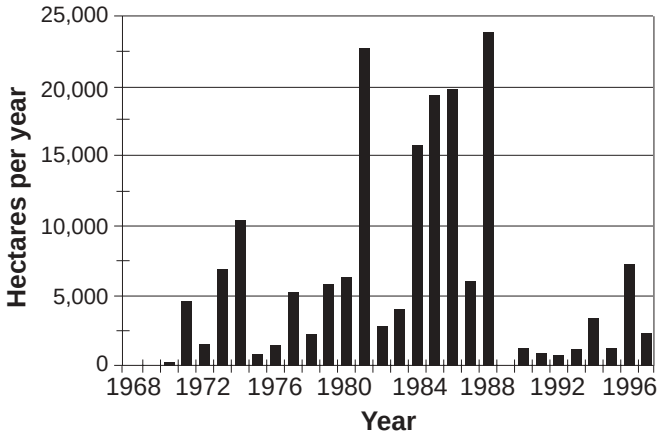

Figure 1—Number of hectares burned by the National Park Service by prescribed natural fire, 1968 to 1997.

Forest Service

The Forest Service first revised its policy of total fire suppression to permit natural fires in wilderness in 1971. The first lightning-ignited fires permitted to burn on Forest Service land were in the Selway-Bitterroot Wilderness in 1972 (Williams 1995). Although areas such as the Selway-Bitterroot and Gila Wildernesses are notable for their progressive wilderness fire programs, as of 1997, only 58 of 398 Forest Service wildernesses had approved fire management plans that permitted the use of PNF's. Most of the other Forest Service wilderness areas are managed under a total suppression strategy, although some areas practice versions of a confine-contain strategy that incorporates many aspects of a PNF program. The Forest Service makes little use of PNF's outside of designated wilderness, with only one nonwilderness PNF being reported in 1997.

Since 1985, Forest Service policy has permitted limited use of management-ignited prescribed fire in wilderness to reduce unnatural buildups of fuel, but only if:

1. The use of prescribed fire or other fuel treatment measures outside wilderness is not sufficient to achieve objectives within wilderness.
2. An interdisciplinary team of resource specialists has evaluated and recommended the proposed use of prescribed fire.
3. The interested public has been involved appropriately in the decision.
4. Lightning-caused fires must be suppressed to avoid threats to life or property within wilderness—or to life, property, or natural resources outside of wilderness.

These conditions have largely restricted the use of MIPF's in Forest Service wilderness to the National Forests of Florida, for which the Chief of the Forest Service granted a 1995 blanket approval for use of MIPF's for resource objectives. Concern over the prohibition of management-ignited fires in wilderness is taken so seriously that a 690 hectares (1,705 acres) 1998 prescribed burn on the Bitterroot National Forest in Montana was suppressed as it spread upslope into the Selway-Bitterroot Wilderness. Recognition of the need to restore fire as an ecological process, coupled with restrictions that continue to require that many lightning-ignited fires be suppressed, has led to increased support for a wider application of management ignitions in Forest Service wilderness (Brown 1992; Mutch 1995). However, a recent proposal for the use of MIPF's in the Frank Church River of No Return Wilderness in Idaho has been stopped by appeals submitted by environmental organizations philosophically opposed to the use of management ignitions in wilderness (Stokes, personal communication).

Although the Forest Service is more diligent than the National Park Service about distinguishing whether individual fires occur within designated wilderness, Forest Service fire records are incomplete and inconsistent. Incomplete fire records and the lack of a centralized record-keeping system make it difficult to assess Forest Service wilderness fire trends. Figure 2 represents our best effort to pull together PNF records from the National Interagency Fire Center in Boise and the fire and wilderness records of each Regional Office of the Forest Service. Although these records show an increase in area burned by PNF from 1995 to 1997, compared to that prior to 1988, virtually all of that area can be accounted for by a small number of large fires in Arizona and New Mexico (1995 and 1997), respectively, and Oregon and Montana (1996). Many of the 1996 fires actually had to be suppressed as they escaped their prescribed boundaries and threatened nearby communities. The Pacific Northwest Region of the Forest Service has been reluctant to restart its PNF program following that experience.

A recent communication from managers of the Bob Marshall Wilderness in northwestern Montana claims that since 1988 the average number of PNF's per year has dropped by over 50 percent, and the average size of PNF's has dropped from 108 to 27 ha (267 to 67 acres). Also, only 19 percent of all eligible fire starts in the Bob Marshall have been managed as PNF's, and 94 percent of the total area burned by PNF's was burned in the single season of 1988

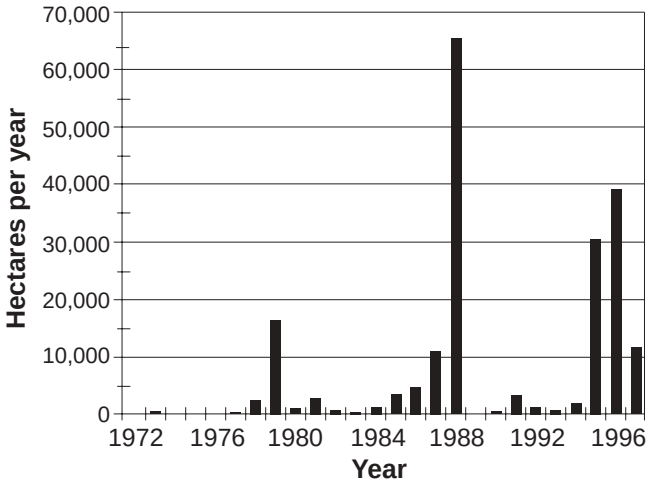

Figure 2—Number of hectares burned in Forest Service wilderness by prescribed natural fire, 1972 to 1997.

(Eckert, personal communication). Another problem with the Forest Service fire data is that area burned under the confine-contain strategy is reported as suppressed wildfires. It is unclear whether the Forest Service PNF program has actually made significant progress in recent years or whether the relatively high amount of area burned in 1995 to 1997 may be more a reflection of a few isolated occurrences (Parsons and Landres 1998).

The limited data available to compare accomplishments of the Forest Service wilderness fire program with what would be required to match presettlement fire return intervals, show that average annual area burned prior to suppression was 1.5 to 1.9 times greater than during recent years (Brown and others 1994) in the Selway-Bitterroot Wilderness. Although data are limited to make similar comparisons for other areas, there is no question that both scientists and managers are greatly concerned about increasingly unnatural conditions under current management practices (Hardy and Arno 1996).

Bureau of Land Management

Despite recognition in Bureau of Land Management policy that "Natural fire (such as, lightning-caused) is normally part of the ecology of the wilderness…" and that "…it may be appropriate to allow natural fire to burn…," fire has not generally been considered a significant concern in Bureau of Land Management wilderness management and has received little planning attention. The first Bureau of Land Management wilderness fire management plan permitting natural fires to burn was approved in 1990 for two wilderness areas in northwestern Arizona. As of 1997, six of the 131 Bureau of Land Management wilderness areas had approved PNF plans. However, due to conservative prescriptions and low natural fire frequency in these areas, no PNF's had occurred as of early 1998. The Bureau of Land Management has made extensive use of what it calls an "Appropriate Suppression Response strategy," under which some naturally ignited fires are contained within defensible boundaries. Although this strategy is similar to a PNF strategy, the fact that fires permitted to burn under Appropriate Suppression Response are recorded as wildfires makes it impossible to assess their contribution to the agency's wilderness fire program. The lack of a wilderness/nonwilderness distinction in Bureau of Land Management fire records further complicates efforts to assess wilderness fire programs. Most Bureau of Land Management wildernesses are managed under a suppression strategy with emphasis given to minimizing impacts of suppression activities.

The Bureau of Land Management makes extensive use of management ignitions within designated wilderness. MIPF's are used to reduce hazards, improve range, benefit wildlife (including threatened and endangered species), and restore natural fire regimes. Again, the lack of a wilderness/nonwilderness distinction in Bureau of Land Management fire records makes it impossible to assess accomplishments within Bureau of Land Management wilderness. No effort has been made to evaluate the divergence between presettlement and recent fire frequencies, intensities, or effects on Bureau of Land Management lands.

Fish and Wildlife Service

Other than recognizing fire as a natural force in wilderness and that burning may be desirable "to restore, maintain, protect, or preserve the wilderness resources and values," the Fish and Wildlife Service has not developed a specific strategy for dealing with wilderness fire. The Fish and Wildlife Service has not recognized the need for permitting lightning fires to burn, and thus has not developed a PNF program, other than what it calls a Limited Suppression program, that is practiced in Alaska. Suppression remains the principal response to lightning ignitions. However, the Fish and Wildlife Service makes extensive use of management ignitions, including within wilderness, to reduce hazardous fuels and to further specific refuge objectives. The small size of most refuges outside of Alaska is particularly conducive to prescribed burning. Records for both MIPF and wildfire within Fish and Wildlife Service units do not recognize whether the fires occur on lands designated as wilderness, making it impossible to compare current fire frequencies with presettlement frequencies on Fish and Wildlife Service wilderness lands.

Assessment

Although all four wilderness management agencies recognize the natural role of fire in determining ecosystem structure and function, they have chosen dramatically different approaches to restoring fire to their wilderness lands. Comparison of the number of approved PNF programs, number of PNF's, and area burned by PNF's in 1997, clearly demonstrates the emphasis placed by the Forest Service and National Park Service on the management of natural ignitions in wilderness fire restoration (table 1). The Bureau of Land Management and Fish and Wildlife Service, on the other hand, rely primarily on prescribed burning to restore fire to their wilderness lands, a strategy also employed by the National Park Service, but to date, largely avoided by the Forest Service. The lack of wilderness/nonwilderness distinction in the fire records of all but the Forest Service, together with the lack of an effective centralized reporting

Table 1—Number of approved prescribed natural fire programs, number of prescribed natural fires, and number of hectares (acres) burned by prescribed natural fires by agency for 1997.

Agency	Prescribed natural fire programs	Prescribed natural fires	Hectares (acres) burned
Bureau of Land Management	6	0	0
Forest Service	58	51	11,577 (28,607)
Fish and Wildlife Service	0	0	0
National Park Service	26	95	2,352 (5,812)

system by all but the National Park Service, makes it impossible to fully assess the effectiveness of any of the agencies in restoring presettlement fire regimes to wilderness lands. Inconsistencies in available data make it even more difficult to make comparisons among agencies.

The limited information that is available comparing historic fire regimes with the results of current fire management activities supports the conclusion that current practices are falling far short of that required to restore presettlement fire regimes. The inability to permit the large majority of natural ignitions occurring in wilderness to burn, coupled with a continued emphasis on fire suppression whenever there is a chance of fire escape, adverse air conditions, or other public or political controversy, is only widening that gap (van Wagtendonk 1995).

The challenges and constraints faced by wilderness fire managers threaten to further reduce the naturalness and wildness associated with our wilderness lands. Unless a way is found soon to increase the effectiveness of programs to restore fire as a natural ecological process in wilderness, continued fire suppression threatens to lead to increasingly homogeneous landscapes, and as fuels accumulate, fires that will be increasingly difficult to control. Such consequences threaten many of the natural resources and social values that characterize wilderness as we know it. The potential effects of such trends on wildlife, vegetation, recreation use, air and water quality, as well as threats of uncontrolled fire (whether the fires are human ignited or naturally ignited) on nearby homes, communities, and other economic interests, require careful evaluation of wilderness fire policies and implementation strategies. The consequences of alternative choices must be clearly understood before they are made. Decisions made in the next few years will influence wilderness and nonwilderness resources and values for centuries to come.

Future Challenges

Significant challenges must be addressed if the United States wilderness management agencies are to be successful in restoring fire to even a semblance of its natural role in wilderness ecosystems. Recognizing that many of the specific issues and constraints that must be confronted will vary depending on the location, size, and other characteristics of the wilderness in question (such as, local political pressures, adjacent land ownership and practices, ecosystem type, historic fire regime), some of the more significant challenges that must be addressed are:

1. Clarification of goals. Public support for wilderness fire management programs will be greatly facilitated if program goals and means for evaluating success are clearly articulated. For example, it must be clear whether a given burn is designed to reduce hazardous fuels, to improve habitat, or to simulate a natural ignition that may have been previously suppressed. Similarly, decisions must be made regarding the appropriateness of management ignitions in wilderness. For example, in areas where natural ignitions cannot be permitted to burn or are suppressed outside the wilderness, are management ignitions more, or less, desirable than a hands-off approach that includes continued fire suppression? The lack of clearly articulated goals leads to confusion and lack of support.

2. Clarification of fire terminology. Periodic changes in fire-use terminology have confused the public and set back efforts to communicate program goals and accomplishments. For example, lightning ignitions allowed to burn within pre-established prescriptions have been variously called "let burn" fires, natural fires, prescribed natural fires, and most recently, wildland fires managed for resource benefits.

3. Reporting consistency. Evaluation of the effectiveness of wilderness fire management programs in restoring natural fire regimes demands consistency in agency fire reporting requirements and record keeping, including distinguishing between wilderness and nonwilderness lands.

4. Improved risk assessment. Assessment of the benefits and costs of all fire management decisions must be based on improved understanding of both the short- and long-term ecological and social consequences of alternative choices. For example, the consequences of continued fire exclusion must be clearly articulated.

5. Increase area burned. Ways must be found to substantially increase the acreage burned. Full consideration must be given to the use of both PNF's and MIPF's as means of both reversing the effects of fire suppression and restoring fire to wilderness. Programs must be effective at larger spatial scales than have characterized past activities.

6. Increased cooperation. Cooperation between landowners and across boundaries is essential to accomplish the landscape-scale fire management programs that will be required to burn larger areas. Interagency planning and programs will be essential to this cooperation.

7. Address constraints. The constraints restricting greater accomplishments in wilderness fire programs include: fiscal (lack of funding), administrative (agency restrictions on number of fires permitted at any given time), political (restrictions on smoke emissions), and human (willingness to take risks). These constraints must be better understood and solutions worked out with the involved interest groups.

8. Improved information base. As management choices become increasingly difficult, it is essential that solid information be available on which to make decisions. This will require an increased commitment to research and monitoring, and improved communication between scientists and managers regarding options and consequences.

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Biodiversity in Finnish Wilderness Areas: Aspects on Preserving Species and Habitats

Anna-Liisa Sippola

Abstract—The relatively continuous belt of wilderness and nature conservation areas in northern Finland forms an ecological corridor between the vast taiga forests of Siberia and the protected areas of the Scandinavian mountains. This corridor has a special importance for the movement and habitat of large predators, and it enables the gene exchange of other taiga species. Many human uses, such as reindeer husbandry, hunting, fishing, forestry, and mineral prospecting affect the diversity of plant and animal species in wilderness areas. The effects of these uses and the means to control them are discussed in this paper.

Three main factors affect the biological diversity of the Finnish wilderness areas: the geographical location of the areas, the use of natural resources within them, and the environmental changes outside the areas. The geographical location of the present wilderness areas is determined by the history of permanent settlement and effective land use, which spread from the south to the north. At the beginning of the 1980's, large continuous areas of wilderness existed only in the northernmost part of the country. The plans to use these areas for commercial forestry gave birth to a wilderness movement, which actively spoke and demonstrated for the preservation of these last pristine areas. Public debate on the issue led to Parliament setting up a committee to decide the fate of these areas, and in 1991, 12 wilderness areas, with a total land area of almost 1.5 million hectares (3,706,500 acres), were established.

Although the remaining Finnish wilderness areas are nowadays not permanently settled, they have been used by humans from the time that the ice sheet of the last glaciation retreated from Fennoscandia, about 10,000 B.C. (Lehtola 1997). Many present uses of these wilderness areas, as well as conflicts in land use, originate from a historic background. Past use has also influenced biodiversity; for example, the European beaver was hunted into extinction at the end of 19th century (Rassi and others 1985).

In this paper, I consider the biodiversity of the Finnish wilderness areas at two levels: (1) the ecosystem and species diversity at the biogeographical level, and (2) the effects of different uses on biodiversity at the species level (table 1). I have left out the factors that affect the outside areas, such as environmental changes along migration routes or wintering areas, and changes at the global level (for example, global climate change and pollution.)

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The Importance of Finnish Wilderness Areas on the Biogeographical Scale

Representativeness of the Wilderness Areas on the National Level

The biogeographical location in Finland is between the hemiboreal zone in the southwestern part of the country and the subarctic zone in the northernmost region of Lapland (fig. 1). Variation in the natural conditions from the south to the north is considerable; the annual mean temperature decreases from more than 5.5 °C to less than 2 °C, and the length of the growing season, respectively, from 180 days to 100 days (Atlas of Finland 1988). Many species already reach their northern distribution limit in southern Finland. Only half of the country's 1,400 vascular plants, and one-quarter of its microlepidoptera, are found in the northernmost part of Lapland (Havas 1983).

The location of wilderness areas in the northernmost part of Finland is, naturally, reflected in the representativeness of habitats when compared with the whole country. Main portions of all of the wilderness areas are either treeless barren mountains (29 percent of the total land area) or highland forests, where annual growth is less than 1 m^3 ha^{-1} y^{-1} (22 percent). About 20 percent of the total area is classified as productive forests. However, the mean annual growth in these forests is about 1.2 m^3 ha^{-1} y^{-1}, while in southern Finland it reaches more than 5 m^3 ha^{-1} y^{-1} in the most productive forests (Kuusela 1977). The most productive forest site type—herb-rich, spruce-dominated forest—comprises only 4 percent of the total land area of the wilderness areas.

The wilderness forests are dominated by Scots pine and, in some parts of the more southern areas, Norway spruce. However, of the 12 designated wilderness areas, seven are found north of the Norway spruce forest line, and four north of the Scots pine forest line (fig. 2). Pubescent birch is common in all the forest site types, and it forms the northern tree line beyond the forest line of conifers. In fertile soils, goat willow, rowan, bird cherry, European aspen, and grey alder can be found up to the forest line. Tree species composition has an importance, especially for the biodiversity of the lower plants and animals, and also for vertebrates, such as bird species. Overall, deciduous trees host more species than conifers, and Norway spruce hosts more species than Scots pine (Esseen and others 1992; Kouki 1993; Rassi and others 1985).

Table 1—The effects of different uses on biodiversity in Finnish wilderness areas.

Use form	Effects	Organisms or species affected
Reindeer herding	Overgrazing Disturbance and erosion by motor vehicles Hunting of predators	Plants, soil invertebrates Animals, especially during nesting time, vegetation Large predators
Hunting	Decrease of populations	Grouse species, predators
Fishing	Overfishing Fish planting	Mainly lake trout Mainly whitefish
Gold prospecting	Silting up of river bottoms Littering Disturbance	Salmonid fishes Various groups Various groups
Forestry	Changes in forest structure Fragmentation	Sedentary birds, lower plants and animals All organisms, especially birds and mammals
Tourism	Disturbance Littering	Various groups Various groups
Poaching	Decrease of populations	Large predators, moose, grouses
Regulation of waters	Unnatural changes of water level	All fish species, especially salmonids
Collection of rarities	Decrease of populations	Birds, butterflies, plants

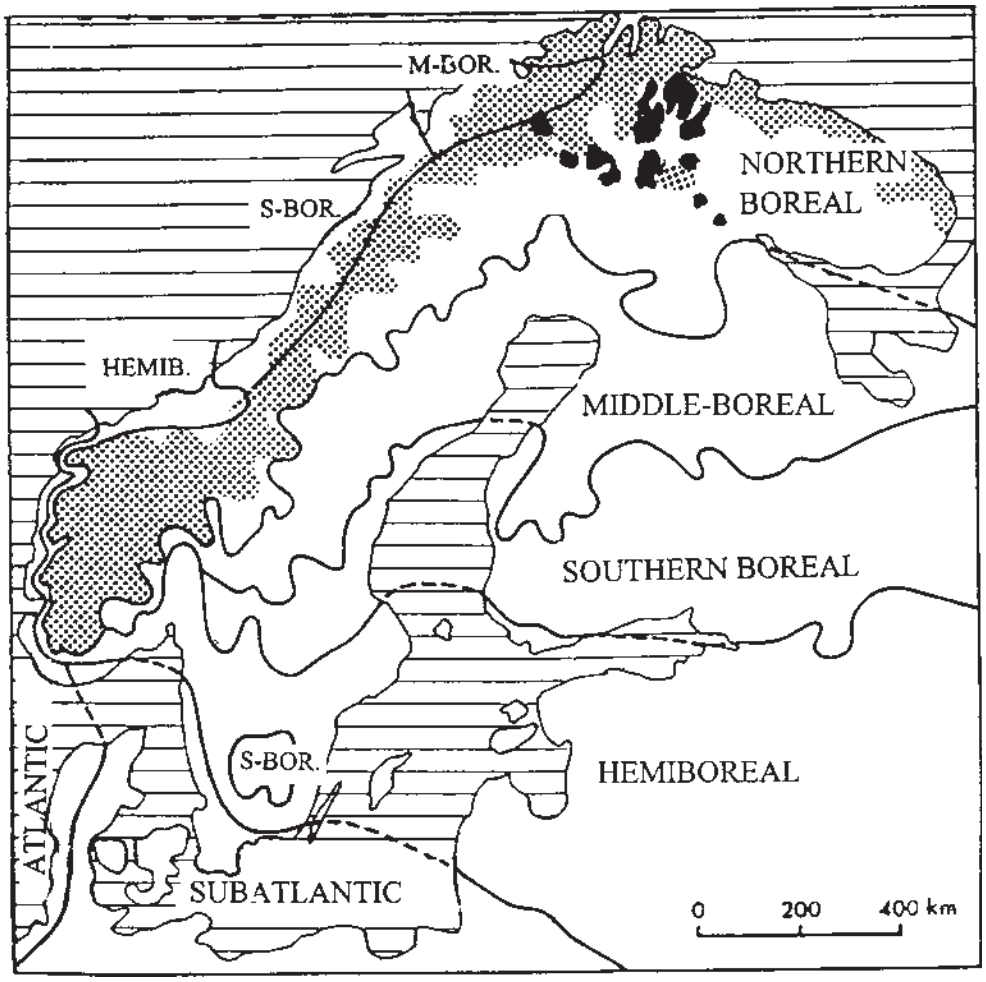

Figure 1—The Finnish Wilderness Areas (black) in relation to the vegetation zones of northern Europe. The dotted area is the subarctic (or arctic-alpine) zone. Redrawn from Ahti and others (1964), Kalliola (1973), and Erä maakomitean mietintö (1988).

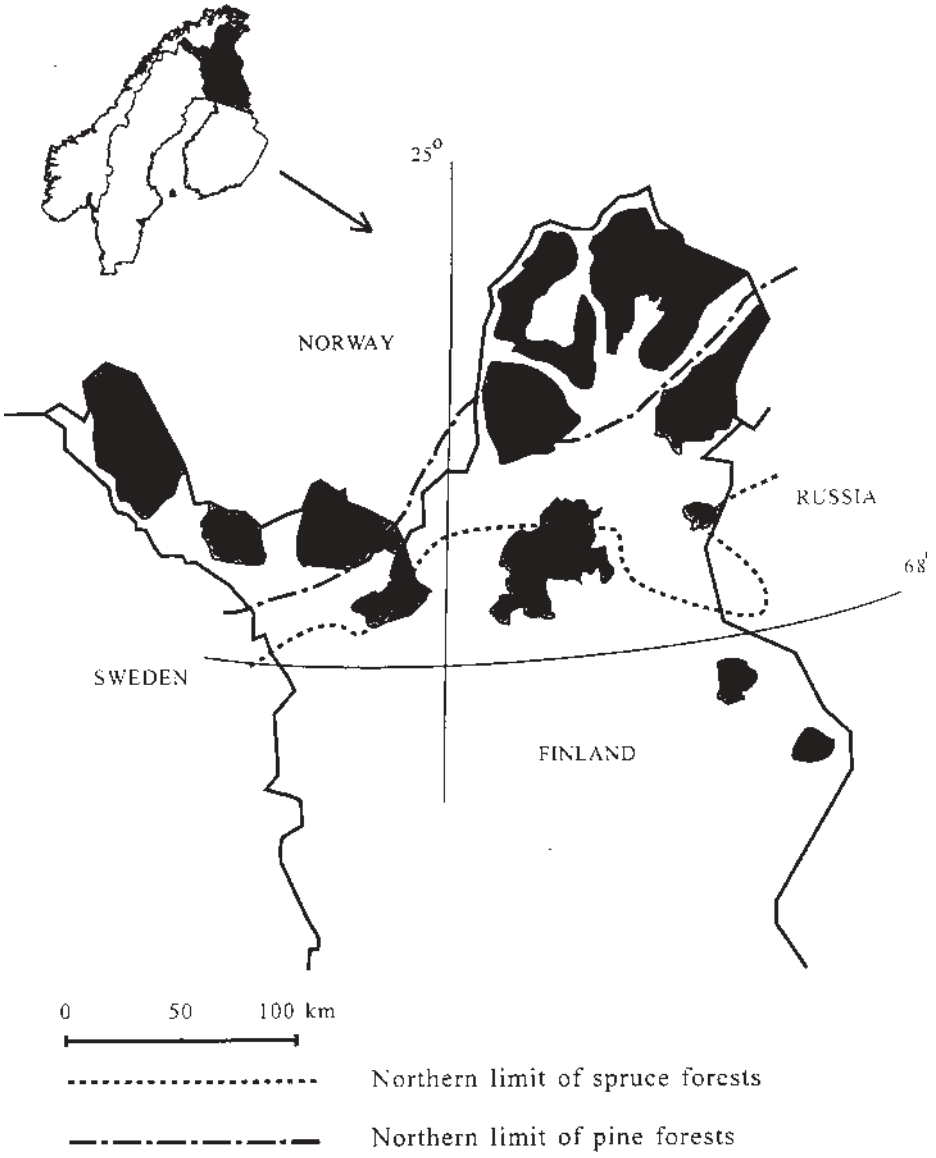

Figure 2—The location of the Finnish Wilderness Areas (black) in relation to the northern treeline of Scots pine and Norway spruce. Redrawn from Heikinheimo (1921), Hustich (1958), and Erä maakomitean mietintö (1988). The black area in the index map shows the reindeer herding area in Finland.

At the national level, the Finnish wilderness areas do not thus represent the entire biota of the country. They have, however, an importance in the protection of species and habitats that typically have northern distribution. The conservation value of the areas can be measured by the representativeness of habitats and species on a certain geographical scale, or by the occurrence of endemic, rare, or endangered species. Rare species can also be found in the unproductive habitats of the wilderness areas, such as barren mountains or dry pine forests (Rassi and others 1992; Renvall 1995; Sippola and Renvall 1998). Some of the most important features of the Finnish wilderness, however, are its size, the entity of its unbroken habitats, and the low disturbance level by human beings. For many mammals and birds, the landscape level is more important than separate habitats (Hunter 1990). This is especially true for species that we consider as "typical northern wilderness species," such as wolves, wolverines, brown bear, golden eagles, and snowy owls and gyrfalcons.

Importance of Finnish Wilderness Areas on the Fennoscandian Level

The importance of Finnish wilderness areas is emphasized when they are considered on a larger scale. With the boreal forests in European Russia, the Finnish wilderness and nature conservation areas form the western projection of the vast taiga forests of Siberia, and a corridor of natural ecosystems between the relatively intact ecosystems of northwestern Russia and the mountain area of Norway and

Sweden, where the largest protected areas of these countries are found. This belt of continuous habitats has an importance, especially in the protection of species that need large territories, such as large predators and birds of prey. It enables the exchange of genes in a larger area, thus inhibiting genetic deterioration. It also enables the flow of new individuals when all the individuals from an area have been extirpated. This is the case with the wolf population in Finnish Lapland, which is mainly maintained by individuals immigrating from the Russian taiga (Rassi and others 1992). Relatively little is known about the magnitude of gene exchange in lower plants and animals on the landscape level. However, the genetic structure of a polyporous fungus (*Fomitopsis rosea*) in its fragmented, isolated environment in Sweden was more narrow than the genetic structure of its populations in the large continuous forests of the Russian taiga (Högberg and Stenlid 1997).

Legislation, Administration, and Use of Wilderness Areas

A separate law has established Finnish wilderness areas. Unlike many other countries, these areas are not under nature conservation legislation. The purpose of the wilderness areas is, according to the law: "To preserve the wilderness character of the areas, to ensure the continuity of Sámi culture and subsistence livelihoods, and to develop multiple use of the areas" (Erämaalaki 1991). Actually, the words "to preserve the wilderness character" are the only words that refer to the protection of nature in the wildernesses. The other purposes, especially the goal to develop the multiple use of the areas, can even be contradictory to the goal of preservation.

The more specific orders in the legislation have elements that can either promote or hinder the conservation of biodiversity. It is prohibited to construct roads or to open a mine in a wilderness. However, the government can give special permission for both activities if they are of special importance for livelihood or general interest. It is not allowed to give, sell, or rent the land area without the permission of the government, except for the needs of subsistence livelihoods (Erämaalaki 1991).

The wilderness areas are administered by the Finnish Forest and Park Service (FPS), which governs most state-owned land. The FPS has three divisions: Forestry, Recreation Services (Villi Pohjola), and Nature Conservation Services. Nowadays, the first two divisions are profit-making organizations, but the Nature Conservation Division, which administers the wilderness areas, does not operate commercially.

Several different uses are allowed in the wilderness areas (table 2). Hunting and fishing are the oldest forms of use of the wilderness. Due to its historic background, hunting is allowed without permission or fee in the state-owned land within the home municipalities of local residents in northern Finland, except in strict nature reserves (Metsästyslaki 1993). The FPS (Villi Pohjola) sells hunting licenses for wilderness areas to nonresidents. This has caused conflicts between the FPS and local residents in some regions where game populations are weak (Lapin Kansa 1998a,b).

Local residents have had immemorial fishing rights in the lakes and rivers on the state-owned land in northern Finland. Many of these rights are, nowadays, questioned. Earlier, there was a separate fishing law for the three northernmost municipalities (where most of the wilderness areas are found) because the dispute over the immemorial fishing rights was not resolved. New fishing laws concerning these three northernmost municipalities were passed in 1996 and 1997 (Kalastuslaki 1996; Laki kalastuslain muuttamisesta 1997). This gave more rights to nonresidents than earlier. For example, angling and ice fishing are free in the waters of the wilderness areas. The effects of the new law on fish populations are not clear, nor are all the legal aspects concerning local rights (Karhu, personal communication).

Reindeer husbandry developed as a means of livelihood in the 16th century, when the Sámi started to domesticate and herd wild mountain reindeer (Lehtola 1997). Reindeer are so-called "semi-domesticated" animals, which freely roam the terrain most of the year and are herded into corrals for slaughter and calf branding twice a year. The "Law on Reindeer Herding" allows reindeer herding and the use of motor vehicles for herding activities in northern Finland, irrespective of land ownership, within the areas designated for reindeer husbandry (Poronhoitolaki 1990). Reindeer herding has become more motorized and has developed more as a commercial activity since the 1960's. With more efficient management methods, including winter feeding using hay, the number of reindeer significantly increased between the early 1980's and the early 1990's. This has led to overgrazing of winter pastures in many areas (Kumpula and others 1998).

Gold prospecting started in the mid 19th century in north central Lapland (Luhta 1995). The "Mining Law" (Kaivoslaki 1965) allows for prospecting minerals, but opening a mine in the wilderness without the permission of Parliament is forbidden (Erämaalaki 1991). Gold prospecting, both with traditional methods and by using motorized earth-moving equipment, such as Caterpillars, mainly takes place in the Hammastunturi wilderness area.

The main issue that triggered the debate over wilderness preservation in the 1980's was the threat of commercial forestry in the remaining wilderness areas. As a compromise between the conflicting interests, the Parliament-appointed committee decided to allow forestry in part of the most productive, pine-dominated wilderness forests. Separate management guidelines, called the natural forest management method, were designated for wilderness areas. These included relatively small-scale seed tree or selective cuttings, and the natural regeneration of trees (Metsähallitus 1991). A more specific forestry designation for each area will be in the management plan. Thus far, two management plans have been adopted by the Ministry of Environment, and the first logging in wilderness areas was done in 1997.

Of the other laws affecting biodiversity in wilderness areas, the "Law on Terrain Driving" has importance. According to this law, the use of a motor vehicle on terrain, without the permission of the landowner, is prohibited (Maastoliikennelaki 1995). Getting permission for subsistence use, such as hunting or fishing, is possible. Reindeer herders can use terrain vehicles, such as four wheelers, motorbikes, and snowmobiles, in their herding activities—both during winter and summer (Maastoliikennelaki 1995).

Table 2—The threatened mammals and birds of Lapland (extinct species not included), main reasons for their threatened status, and their estimated population levels. Sources: Rassi and others (1992), Kojola (1998), Väisänen and others (1998), T. Ollila [personal communication].

Species	Class of threat	Reasons of rarity	Estimated population level in Lapland
Endangered mammals			
Arctic fox (*Alopex lagopus*)	Endangered	Competition with red fox, perhaps sicknesses, changes in reindeer herding	Maximum 20 individuals, last denning in 1996
Wolverine (*Gulo gulo*)	Endangered	Poaching, disturbance	About 60 individuals
Wolf (*Canis lupus*)	Vulnerable	Hunting, poaching, disturbance	About 10 individuals, no recent reports of denning from last years
Lynx (*Lynx lynx*)	Vulnerable	Hunting	About 40 individuals
Brown bear (*Ursus arctos*)	Vulnerable	Hunting, poaching	About 140 individuals
Endangered birds			
Lesser white-fronted goose (*Anser erythropus*)	Endangered	Hunting, disturbance, environmental changes in wintering areas	Observations of 10 individuals in 1997, last nesting in 1995
Shore lark (*Eremophila alpestris*)	Endangered	Environmental changes in wintering and migration areas, pollution	Estimated pair number 5
White-tailed eagle (*Haliaetus albicilla*)	Endangered	Environmental pollution, forestry, building, disturbance	About 16 pairs
Scaup (*Aythya marila*)	Endangered	Hunting, environmental pollution	Estimated number of pairs 50, nests only in the northernmost part of Lapland
Golden eagle (*Aquila chrysaetos*)	Vulnerable	Hunting, disturbance, forestry	About 280 pairs
Gyrfalcon (*Falco rusticolus*)	Vulnerable	Hunting, disturbance, egg collecting	About 30 pairs in the three northernmost municipalities
Peregrine falcon (*Falco peregrinus*)	Vulnerable	Environmental pollution, egg collecting	About 100 pairs, population mainly in central Lapland
Snowy owl (*Nyctea scandiaca*) last nestings in 1980's	Vulnerable	Egg collecting, hunting, disturbance	Wandering individuals in mountain areas,
Velvet scoter (*Melanitta fusca*)	Vulnerable	Hunting, disturbance, pollution in wintering areas	About 800 pairs, mainly in northernmost Lapland
Lesser spotted woodpecker (*Dendrocopos minor*)	Rare	Forestry	Estimated pair number 40
Merlin (*Falco columbarius*)	Rare	Environmental pollution	About 1,500 pairs in central and northern Finland
Hobby (*Falco subbuteo*)	Rare	Environmental pollution	Southern distribution, only occasionally in northernmost Lapland
Kestrel (*Falco tinnunculus*)	Rare	Environmental pollution, changes in agriculture	About 540 pairs in central and northern Finland, population low in Lapland
Red-throated diver (*Gavia stellata*)	Rare	Ditching, disturbance, pollution, hunting	About 100 pairs mainly in northernmost Lapland
Black-throated diver (*G. arctica*)	Rare	Water constructions, disturbance, pollution	About 6,000 pairs in all of Finland, in northernmost Lapland 0.3 pairs/km^2 water
Lesser black-backed gull (*Larus fuscus*)	Rare	Disturbance, hunting	In the biggest lakes and in northernmost mountains in Lapland
Common scoter (*Melanitta nigra*)	Rare	Disturbance, pollution	About 1,500 pairs in all of Finland, mainly in northern Finland
Osprey (*Pandion haliaetus*)	Rare	Forestry, disturbance, pollution	About 1,000 pairs in all of Finland, not in northernmost Lapland
Dipper (*Cinclus cinclus*)	Rare	Pollution, water constructions	About 3,000 pairs, mainly in northern and eastern Finland
Bar-tailed godwit (*Limosa lapponica*)	Rare	Egg collecting	About 100 pairs in the northernmost mountains in Lapland

Tourism and recreation are small but growing activities in the wilderness areas. Until now, recreation has mainly been hiking, canoeing, or boating, and cross-country skiing during the winter. Terrain driving is prohibited, but marked snowmobile routes do cross some wilderness areas. Guided tours, terrain biking, and dog teams are increasing activities in the wilderness. Air transport is allowed, and it is used frequently in the summer for travel to the most popular fishing areas. The Forest and Park Service controls tourism by restricting the number of cabins and other services (Hammastunturin erämaan hoito-ja käyttösuunnitelma 1996).

Effects of Different Uses on Biodiversity of Wilderness Areas

Reindeer Husbandry

Reindeer husbandry affects biodiversity at three levels (table 1):

1. Overgrazing affects the composition of vegetation and diversity of soil fauna.
2. The use of terrain vehicles affects the vegetation and disturbs animal life.
3. The legal and illegal killing of predators affects predator populations.

Studies on the effects of reindeer on vegetation and soil fauna have, in part, given contradictory results. Large reindeer numbers obviously modify the forest structure by preventing the regeneration of birch (Helle and others 1998; Hyppönen 1998; Lehtonen and Heikkinen 1995; Mäkitalo and others 1998). The study by Kojola and others (1998) shows that the numbers of some soil invertebrates have decreased in the grazed areas. The results produced by Suominen and others (1998), on the contrary, showed an increase in most soil invertebrate groups. According to their results, plant diversity has also increased in moderately grazed areas. The authors conclude that moderate grazing increases the diversity of plants and soil fauna, while too heavy grazing is detrimental.

The use of terrain driving is not restricted to reindeer herding. Fishermen, berry pickers, and persons in different administrative and official duties also use motor vehicles on the terrain. Very little is known about the disturbance caused by motor vehicles on animal life. Disturbances during nesting can obviously be harmful for birds, such as the golden eagle. Most damage to vegetation is done during the summer by four-wheelers. Driving is usually concentrated on the routes leading to the fishing lakes or reindeer corrals. During the planning process for the management plan, the routes for terrain driving are planned with the local users to minimize the effects on vegetation and animal life (Olli 1995).

Large predators are the natural competitors of reindeer herders. Wolves and wolverines are considered the worst predators, because they often kill as many animals as they can at one time. The brown bear mainly kills calves and weak animals, as does the golden eagle. The lynx lives at the limit of its northern distribution in Lapland, and is not often found in the wilderness areas. The status of large predators is considered more thoroughly below.

Hunting

Legal hunting in the wilderness areas is mostly directed at moose and different grouse species, including capercaillie (Scotch grouse), black grouse, willow grouse, and rock ptarmigan. Other hunted animals include hare, pine marten, red fox, bean goose, and ducks. The grouse population significantly declined throughout the country from the 1960's into the 1980's, and the populations have remained low (Helle and Helle 1991; Helle and others 1997). No data are available on the hunting pressure on grouse species in the wilderness areas. The Forest and Park Service has not publicly released figures on the number of hunting licenses sold, making an estimate of the real hunting pressure more difficult. However, due to an annual census, the moose population is rather well known, and the number of animals annually killed is controlled. Besides legally killed animals, dozens of illegal moose poaching cases are exposed every year. In 1996, 67 moose poaching cases were revealed in the province of Lapland, 38 of them occurring in municipalities where wilderness areas are found (Nevala, personal communication).

All large predators found in the country are included in the "Red Data Book of Finland." The estimated minimum numbers of predators in the reindeer herding area (which is the entire northern region of Finland) show that the brown bear population is in no immediate danger of extinction (table 2). The majority (80 percent of the total population) lives outside the reindeer herding area (Kojola 1998). However, most wolverines (55 percent) live within the reindeer herding area, showing that the population is rather weak (table 2). Of the lynx population, only 5 percent live in northern Finland. The worst situation is with wolves; in 1998, there were an estimated 10 individuals in the reindeer herding area, and there have been no signs of denning over the past few years (Kojola 1998). Most golden eagles (about 280 pairs out of 310) live in Lapland (Ollila, personal communication).

Despite their inclusion in the "Red Data Book of Finland," hunting brown bear, wolf, and lynx during the hunting season is allowed. The number of hunted animals per area is fixed annually. For example, in 1997 the quota of brown bears for northern Finland was 35. Altogether, a total of 22 animals were killed, 10 of these in the Province of Lapland. Besides seasonal hunting, special permission to kill the predators that attack reindeer or other livestock may be granted outside the hunting season. In 1997, the Ministry of Agriculture and Forestry gave permission to kill two wolves in Lapland (Kainulainen, personal communication). No statistics exist on the numbers of illegally killed animals. Those cases that are revealed are registered in the local police district. The local District Police Superintendent for the two northernmost municipalities (Inari and Utsjoki) in Lapland estimates that only about half of the illegal hunting cases are discovered by the police, and only one-fifth of those are solved (Karhu, personal communication). Data from these two municipalities show that the number of

hunting crimes revealed has increased from 12 in 1990, to 22 in 1996 (Feodoroff 1997). However, whether this increase is due to a real increase in cases or more effective patrolling over the past few years is not known.

Although reindeer herding clearly has a conflicting relationship with predators, not all cases of illegal killing are necessarily attributable to reindeer herders. The skin and meat of brown bear are especially valuable. In northern Sweden, the most common cause of death for brown bears tagged with radio transmitters was illegal killing (Kojola, personal communication).

Fishing

Three major activities have affected the fish population of the wilderness waters (table 1):

- Overfishing
- Regulation of waters
- Introduction of foreign species or genetic strains

Both lakes and sections of rivers are overfished. At the moment, overfishing is mainly a problem in some lake trout spawning areas (Heinimaa, personal communication). Lake trout is the only fish species that can be considered as a threatened species in some wilderness waters (Rassi and others 1992). The regulation of waters concerns the basin of the large Lake Inari, and some smaller waters in the Hammastunturi wilderness area. The regulation of Lake Inari has weakened the natural fish populations of both the lake itself and the rivers in the whole basin (Heinimaa, personal communication).

Foreign fish species, mainly whitefish, have been widely introduced into the natural waters of Lapland, including the wilderness areas. The foreign whitefish strains have not, however, reproduced in natural waters. Nowadays, only local strains are used for fish planting. Plantings, both for sport fishing and the needs of local consumption, are made in about 100 small lakes and in some rivers where the populations have weakened. The species used are whitefish, grayling, lake trout, and arctic charr (Tuunainen, personal communication).

Gold Prospecting

Gold prospecting is concentrated mainly on riverbanks, and river water is used for panning. Silt and other soil particles are washed into the river water and accumulate in the riverbed. This can be deleterious for the reproduction of trout and other fish species that spawn in the riverbed gravel. However, very few studies on the effects of gold panning on fish populations exist (Heinimaa, personal communication). Those prospectors that use heavy equipment, such as Caterpillars, are obliged to take water samples regularly from the waters below their work area. The local environmental district monitors the quality of the water samples (Tuohisaari, personal communication).

In addition to potential harm to the fish populations, gold prospecting also increases disturbance in nature through its associated terrain driving, littering, illegal hunting, and dwelling construction. The Forest and Park Service tries to control gold prospecting by taking a security deposit from the prospectors. If the prospectors do not ensure environmental care, the deposit is used to repair the damage after prospecting has ceased (Tuohisaari, personal communication).

Forestry

The effects of forestry on biodiversity vary, depending on the group of organisms under consideration (table 1). The effects of seed-tree cutting on birds, fungi, and beetles were studied in pine forests as a part of the Finnish Wilderness Research Programme. The results thus far can be summarized as:

1. For birds, the total number of pairs, as well as the number of hole-nesters, and species confined to old-growth forests, diminished in logging areas compared with the unlogged control plots. The number of pairs of open habitat and migratory species increased, while those of sedentary birds decreased (Jokimäki and Inkeröinen 1995).
2. The total yield of fungi decreased at logged sites and, in particular, the number of mycorrhizal fungi declined (Paulus and others 1995).
3. The composition of wood-rotting fungi changed considerably. Only half the number of original fungi species found in the old-growth forest was found in the logging waste at the 40-year-old seed-tree cutting areas. However, the residual logs from the time before logging still hosted most of the pristine forest species. The endangered fungi species demonstrated different ecological tolerance to logging: some survived in the residual logs, some had disappeared, and some were able to invade the logging waste (Sippola and Renvall 1998).
4. The total number of beetles increased immediately after logging. In particular, the number of cambiovores and open-habitat species increased. On 15-year-old logging sites, the species composition of general species had changed considerably. Also, the number of rare species diminished over time (Sippola and Kallio 1995). The fragmentation and disturbance caused by forestry were not studied in the Wilderness Research Programme. Where the logging extends into the core areas of the wilderness (such as planned in the Kemihaara wilderness area), both an increase in disturbance and hunting pressure is possible.

Tourism

There are few studies on the effects of tourism in the wilderness areas. The effects are mainly noise and erosion caused by motor vehicles, littering, and the disturbance of animals. Disturbance is mainly the result of ignorance. However, some cases have been revealed where animals were photographed for commercial purposes without care for the regulations on nature conservation.

Other Factors Affecting the Biodiversity of Wilderness Areas

Collecting the eggs of rare birds was very popular in northernmost Lapland at the end of last century and the beginning of this century. Evidence exists that massive egg collection has caused permanent declines in the populations

of some bird species, which now are threatened; the gyrfalcon and snowy owl, for example (Rassi and others 1985). Over the last few decades, the peregrine falcon has been the interest of egg collectors. The last known attempt to smuggle illegally collected bird eggs from Lapland was in 1987 (Rassi and others 1992). The Nordic countries have increased their cooperation in supervising cross-border nature crimes (Karhu, personal communication).

Conclusions

The analysis of the status of biodiversity in Finnish wilderness areas shows that both modern uses and those that have traditional background do have negative impacts on biodiversity. Hunting and fishing have mostly lost their subsistence importance, and are mainly for recreation. Reindeer herding, which still has importance as a means of livelihood, has with modernization adopted management practices that are not on a sustainable basis with relation to the carrying capacity of nature. For forestry, the societal agreements and the contradictory goals within the management organization are in conflict with the conservation goals.

The effective management of biodiversity in Finnish wilderness areas is much hindered by the fact that many different laws and regulations affect the use of nature and natural resources. Mostly, the locus of control in the use of natural resources is outside the area or management organization. The main means to cope with problems are supervising, patrolling, and cooperation with users and interest groups. According to administrative and law enforcement officers, the present resources are too scarce for efficient law enforcement (Karhu, personal communications; Tuohisaari 1998).

It is also evident that regional and national efforts to protect wilderness species are not always sufficient. This is especially true for migratory animals and large predators. Cooperation between Finland, Sweden, and Norway in creating a common predator policy has already started, and communication with Russia on questions of nature conservation has increased. A new approach to predator policy was started in 1997, when the Finnish Parliament adopted a law concerning compensation for damages to reindeer calves made by golden eagles. Earlier, the damages were compensated if the reindeer herders could find the carcasses and prove that the animals were killed by an eagle. According to the new law, the reindeer herding associations will be paid on the basis of the number of nesting eagles within the herding areas. The future will show if this is an effective means to maintain larger predator populations within the wilderness areas.

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Temperature Adaptations of Terrestrial Arthropods of the Yenisey Region of Siberia (Asian Ecological Transect)

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Abstract—Field studies and sampling of terrestrial invertebrates for ecophysiological experiments were undertaken in the summer of 1994 and 1995 in different geographic regions of the Asian Transect (Krasnoyarsk to Karaul) in Siberia. Two important parameters reflecting invertebrate temperature adaptations were investigated: individual thermopreferenda and supercooling point temperatures. The most noticeable differences in thermopreferenda were between tundra and boreal species. The former species prefer temperatures usually 2 to 3 °C lower than the latter. Northern tundra species exhibit no seasonal changes in thermopreferenda, whereas boreal species have seasonal changes in their thermopreferenda. The majority of the species (total of 27 species) investigated are freeze-intolerant and overwinter in a supercooled state. Some arthropods are freeze-tolerant: three species of millipedes (Lithobiomorpha), but only two (adult) beetles from the Carabidae and Staphylinidae. This feature enables such species to be widespread over much of the territory of the Transect. The experimental data suggest that there is no special "northern" variety of cold hardiness in the fauna.

Species distribution and the composition of invertebrate communities strongly depend on physical factors such as climate. A gradual increase in the influence of these factors, especially temperature, on community composition (Wilson and Mohler 1983) can be observed from the equator to the poles (Chernov and Penev 1993; Pianka 1966). In high latitudes, life is dependent more on physical factors than at low latitudes. In the northern regions, temperature adaptations are necessary for the occurrence and survival of species (Block 1990; Chernov 1989; MacLean 1975).

Thermal conditions of the environment play a decisive role in the distribution of poikilothermic animals. This is very clearly demonstrated in ecological transect studies (Rybalov 1996; Rybalov and Rossolimo 1998; Striganova 1996). A number of parameters reflect thermal adaptations of invertebrates. The interrelations of species distribution with two important parameters of invertebrate thermal adaptations—thermopreferenda and cold tolerance—are investigated in this paper. The aim of this research was to investigate the differences in thermal adaptation of arthropods distributed in different climatic zones along a geographical south-north transect in Siberia. A total of 27 species of terrestrial arthropods was examined from different landscape-zones: northern, those spread over several zones (polyzonal), and boreal species.

Material and Methods

Samples were collected in 1994 and 1995 in the middle and lower sections of the Yenisey River (Asian Ecological Transect) (Rybalov and Rossolimo 1998). There are dramatic changes of climate, especially temperature, along the Yenisey River, which cause considerable changes in the structure of the animal and plant communities. There are three landscape zones, including eight subzones, located along the part of the Asian Ecological Transect that was investigated: arctic landscape zone, typical tundra, southern tundra, forest tundra, northern taiga, middle taiga, southern taiga, and subtaiga forest. The most northern of the locations visited was Sybiryakov Island (73° N, 80° E), and to the south the Transect extended to Predivinsk (57° N, 93° E). The length of the Transect was 2,500 km along the Yenisey River.

Animal Material

Myriapoda, Order Lithobiomorpha—Polyzonal species: *Monotarsobius curtipes* and *Lithobius proximus* are both widespread and distributed from forest tundra to subtaiga forest.

Boreal species: *Monotarsobius worogowensis* is distributed in south taiga and subtaiga zones.

Coleoptera, Family Carabidae—Northern tundra species: *Pterostichus pinquidineus* penetrates southwards into the north taiga subzone. *Pterostichus brevicornis* and *Curtonotus alpinus* are northern tundra-taiga species; in the southern part of the Transect they occur in the middle taiga subzone. Both *Carabus odoratus* and *Pterostichus vermiculosus* are northern tundra species but penetrate south into forest tundra. *Diacheila polita* is a northern, north tundra-taiga species and distributed south to the northern taiga subzone.

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Polyzonal species: *Pterostichus montanus* is a widespread species, distributed from typical tundra to subtaiga forests. *Notiophilus reitteri* is a widespread species distributed from south tundra to subtaiga forests.

Boreal species: *Pterostichus ehnbergi*, *Pterostichus dilutipes*, and *Amara brunnea* are widespread species, distributed from forest-tundra to subtaiga forests. *Pterostichus drescheri* and *Carabus aeruginosus* are taiga species, found mostly in taiga and subtaiga forests, but penetrating to the north along the intrazonal landscapes. They are rarely found in forest-tundra. *Carabus regalis* and *Calathus micropterus* are taiga species, distributed mostly in taiga and subtaiga subzones.

Coleoptera, Family Staphylinidae—Northern, tundra species: *Atheta sibirica* is a northern species found only in the tundra zone. *Lathrobium poljarnis* is a northern species, occurring in tundra and forest-tundra.

Relatively northern species: *Mannerheimia arctica* occurs in forest-tundra and in northern and middle taiga *Atheta* (s. str.) *graminicola* is found in southern tundra and in taiga.

Polyzonal species: *Liogluta micans* is a widespread species; distributed from tundra to subtaiga forest.

Boreal species: *Oxypoda annularis* is found in forest-tundra and in all taiga subzones. *Quedius jenisseensis* and *Quedius fuliginosus, and Tachinus rufipes* are distributed in taiga and subtaiga forests.

Laboratory Procedures

Thermopreferenda—Experiments on temperature preference of arthropods were made using a thermal gradient apparatus constructed of plaster with concentric experimental canals (Rossolimo and Rybalov 1979; Tikhomirov and Tikhomirova 1972). The dimensions of the apparatus were 70 x 40 x 7 cm with the canal diameter being 0.5 to 2.0 cm. Insects of different body sizes were examined in canals of corresponding diameter. Temperatures ranged from 6 to 30 °C across the apparatus. The relative humidity of air in the apparatus approximated to 100 percent, the atmospheric humidity normally occurring within the soil habitat of such arthropods. This is also the natural humidity for most soil-dwelling invertebrates. Most of the species examined were predators, and during the experiments individuals were placed in separate canals. At the beginning of the experiment, each specimen was placed in the 16 to 18 °C zone and left to explore for 60 to 90 minutes. The temperature was recorded for the zone where the animal stopped and rested. The insect was then disturbed and forced to reselect its preferred temperature. The average number of individuals examined for each species was 10 to 20, giving a total of 120 to 200 observations of temperature preferenda.

Supercooling Points—Individual supercooling points (SCPs) were measured with a thermocouple attached to each individual arthropod when cooled, using a micro-refrigerator with a cooling rate of 1 °C min^{-1}. The SCP was recognized as an exotherm on a trace of the temperature curve shown on a chart recorder (KSP-2). The average number of individuals determined for each species was in the range 20 to 40.

Student's test—Student's test was used to determine significance in the thermopreferenda and SCP data.

Results and Discussion

Dramatic changes in climate from south to north along the Asian Ecological Transect produce noticeable differences in landscape and in the distribution of terrestrial invertebrates. Invertebrates are most diverse in the southern part of study in the Transect—throughout the southern taiga and subtaiga subzones. This is particularly so for millipedes, bugs, several beetles in the families Carabidae, Staphylinidae, and Elateridae. It is characteristic for invertebrate species in these zones to have extended ranges in the south-north meridian direction, which include several landscape zones. Beyond the limits of their main distribution most species are rare and only inhabit intrazonal landscapes. Many typically northern species are found relatively far to the south via intrazonal landscapes; for example, the northern carabids *Curtonotus alpinus* and *Pterostichus brevicornis* are recorded in the middle taiga subzone. Similarly, some southern boreal species reach the northern regions by intrazonal landscape habitats. A significant component in the arthropod communities of the Transect comprises polyzonal species with very wide distributions, covering most of the subzones investigated, such as the carabids *Pterostichus montanus* and *Notiophilus reitteri*, and the staphylinid *Liogluta micans*.

This correlation of landscape and ecological/zonal distribution of terrestrial and soil-dwelling invertebrates has two main causes: first, the similarity of abiotic conditions, especially soil temperature, when compared with the above ground layers of such ecosystems; and second, the difference in the adaptations of invertebrates to temperature.

Comparative Analysis of Thermopreferenda

It is necessary to use experimental techniques to investigate the thermal adaptations of terrestrial invertebrates, especially arthropods. A considerable amount of experimental data on thermopreferenda of different invertebrate taxa, mostly from temperate regions, has been accumulated. Recent studies devoted to thermopreferenda of arctic and subarctic species include Babenko (1993) and Rossolimo and Rybalov (1994).

Myriapoda, Order Lithobiomorpha—Thermopreferenda of three species were investigated: *Monotarsobius curtipes*, *Lithobius proximus*, and *Monotarsobius worogowensis*. The most numerous species, *M. curtipes*, from forest tundra and middle taiga areas was examined in detail. Individuals from the forest tundra population had a wide range of temperature preferences from 14 to 25 °C, the majority being in the range 17 to 22 °C in summer. The mean thermopreferendum was 18.2 °C. In autumn animals, the thermopreferenda were similar: 13 to 25 °C and 16 to 21 °C, respectively; the mean being 17.9 °C. Individuals of the taiga population had thermopreferenda of 16 to 26 °C (July) and 15 to 25 °C (September). In both summer and autumn, the most preferred temperature was between 18 and 22 °C.

Lithobius proximus thermal preferences were very similar to *M. curtipes*. This species had a wide range of temperature (12 to 24 °C), and thermopreferenda (18 to 22 °C). There were no seasonal dynamics in its thermopreferenda.

In summer and autumn, *Monotarsobius worogowensis* preferred higher temperatures than the two previous species; in summer it was 16 to 27 °C, and the most preferred temperature was in the range from 18 to 24 °C. The mean thermopreferendum was 19.6 °C and there were no seasonal changes in thermopreferenda.

The three species of Lithobiomorpha studied had thermopreferenda corresponding to their distribution in landscape zones. Boreal species such as *M. worogowensis* chose higher temperatures (by 2 to 2.5 °C) than the other two widespread species. None of the three species showed seasonal changes in their thermopreferenda.

Coleoptera, Family Carabidae—Most of the carabids could be combined into three groups (see Material and Methods section). The first group includes northern, mostly tundra, species. The second, more numerous group, comprises boreal species, while the third, and not so abundant, group contains polyzonal species with wide distributions along the Transect.

Pterostichus pinquidineus individuals collected from the western part of the Taimir Peninsula demonstrated summer thermopreferenda from 13 to 22 °C with a mean value for July and August of 16.2 °C. More often, individuals preferred temperatures from 15 to 18 °C (zone of most preferable temperatures). In autumn, the thermoprefenda and the zone of most preferred temperatures were similar, but slightly lower—from 12 to 21 °C and 14 to 17 °C, respectively. The mean thermopreferendum was also slightly lower in autumn at 15.6 °C. However, statistical comparison of summer and autumn thermopreferenda showed no significant difference ($P > 0.05$).

Thermopreferenda were examined in *Curtonotus alpinus* individuals collected from two areas of the western Taimyr Peninsula in typical southern tundra, and they ranged from 13 to 24 °C. In summer, individuals chose temperatures mostly from 16 to 20 °C (mean 17.4 °C). In autumn, both of these parameters remained unchanged: 13 to 23 °C for thermopreferenda and 16 to 19 °C for the zone of most preferred temperatures. The mean thermopreferendum in September was 17.8 °C, which is close to that in summer. There was no statistical difference between summer and autumn thermopreferenda ($P > 0.05$). This typical northern tundra carabid is relatively stable in its seasonal thermal requirements.

There were significant differences between thermopreferenda of northern tundra species (such as *Curtonotus alpinus*, *Pterostichus brevicornis*, and *Pterostichus pinquidineus*) and boreal species (such as *Pterostichus dilutipes*, *Carabus regalis*, and *Calathus micropterus*). The former had mean thermopreferenda and a most preferred temperature zone (14 to 18 °C) usually about 2 to 3 degrees lower than the latter (17 to 23 °C). In summer, tundra species exhibited a wider temperature zone than boreal species. Polyzonal species such as *Pterostichus montanus* and *Notiophilus reitteri* usually choose a wide temperature zone (13 to 25 °C) with no distinct area of most preferable temperatures.

The 15 carabid species examined had different seasonal changes in their thermopreferenda and may be combined into four groups with similar seasonal temperature choices. The first group contains species without strong seasonal dynamics in their thermopreferenda; these are typical northern tundra taxa—*Pterostichus pinquidineus* and *Pterostichus brevicornis*. The second group comprise species with seasonal changes in thermopreferenda—choosing the lower temperatures in autumn than in summer—*Pterostichus ehnbergi*, *P. dilutipes*, *P. drescheri*, *Carabus aeruginosus*, and *C. regalis*. There were significant differences between summer and autumn thermopreferenda ($P < 0.05$ or $P < 0.01$). *Amara brunnea* belongs to the third group, which had a statistically significant increase in its mean thermopreferendum in autumn compared with summer by 3 to 6 °C ($P < 0.01$). Species in the fourth group have two preferable temperature zones in autumn; one encompasses the same temperatures as in summer while the second has lower preferable temperatures than in summer. This was noted for the boreal carabid *Calathus micropterus* and the polyzonal *Notiophilus reitteri*. These bimodal thermopreferenda may be explained by the physiological differences between individuals in the population in autumn during preparation for overwintering. The species of Carabidae examined showed a broad correlation of landscape zone distribution with their thermopreferenda and the seasonal changes.

Coleoptera, Family Staphylinidae—Analysis of experimental data on the thermopreferenda of 6 species of staphylinid beetles demonstrated similar tendencies to the Carabidae examined. In the northern species *Lathrobium poljarnis*, the area of preferable temperatures is 2 to 4 °C lower in comparison with those of boreal species. The thermopreferendum of *L. poljarnis* is 13 to 18 °C, mean value is 16.5 °C (boreal species lie in the range 16 to 21 °C). Species distributed in the taiga region but also found in more northern areas, such as *Liogluta micans* and *Oxypoda annularis*, choose intermediate temperatures (14 to 19 °C) between the thermopreferenda of tundra species such as *Lathrobium poljarnis* and boreal species such as *Quedius jenisseensis* and *Tachinus rufipes*.

The seasonal changes in thermopreferenda of the Staphylinidae were similar to those of the Carabidae. In the former are species without seasonal dynamics in thermopreferenda: the northern species *Lathrobium poljarnis* and the boreal species *Liogluta micans*, which penetrates into the northern regions. In the latter are *Oxypoda annularis* and *Tachinus rufipes*—both exhibiting statistically significant decreases in mean thermopreferenda of 2 to 3 °C in autumn. Species belonging to a third group (*Quedius fuliginosus* and *Quedius jenisseensis*) have statistically significantly higher thermopreferenda in autumn than in summer (by 2 to 2.5 °C).

Comparative Analysis of Cold Resistance

Adaptations to low winter environmental temperatures are important for the survival of many terrestrial invertebrates. Avoidance of damage by cold in invertebrates living in low temperature habitats is achieved by two main physiological mechanisms: by avoiding freezing through supercooling (maintenance of their body fluids in the liquid phase below the normal freezing temperature) and by tolerance to extracellular freezing (freeze-tolerant) (Salt 1961). The former species are termed freeze-intolerant (Block 1982a). Arthropods employ both strategies and in some species both occur, but in different life stages. Switching from one to the

other strategy has been reported in a coleopteran species by Horwath and Duman (1984). The mechanisms underlying both strategies depend on signals from the surrounding environment (Bale 1989). Because of the widespread occurrence of the freeze-avoiding strategy in arthropods (Block 1982a, 1990), the supercooling ability was used as a convenient index for comparison of cold resistance in samples collected from the Transect. This involved the measurement of individual supercooling (freezing) point temperatures (SCP; see Methods section) and assessment of their subsequent survival. Some cold-hardiness data for sub-Arctic Coleoptera have been reported by Rossolimo (1994).

Myriapoda, Order Lithobiomorpha—All species of Lithobiomorpha examined were freeze-tolerant and overwinter in a frozen state. Three species of millipede show similar SCPs and seasonal changes. The mean SCP of *Monotarsobius curtipes* individuals collected in forest tundra in July was –4.5 °C, in September it was –3.9 °C, and in February it was –3.1 °C. The mean SCP of individuals collected from the middle taiga zone in July was –4.9 °C, in September it was –3.2 °C, and in February it was –3.1 °C. Because this species overwinters in a frozen state, this may explain the very small seasonal changes in supercooling ability due to their particular nucleators remaining active all year round. Relatively high freezing temperatures are common in animals surviving at subzero temperatures with extracellular ice in their bodies.

Coleoptera, Family Carabidae—Ground beetles may be placed in three categories based on the SCP data. The first category comprises the northern species *Pterostichus brevicornis*, *P. vermiculosus*, *P. pinquidineus*, *Diacheila polita*, and *Carabus odoratus*. A further species belongs to this category—*P. montanus*—which is widespread and penetrates north along the Transect. The cold resistance (supercooling ability) of these species remains unchanged with the seasons. All the ground beetles examined were freeze-intolerant. These species either overwinter in a supercooled condition or in some cases the adult instar does not overwinter.

The second category includes boreal species with their main distribution in the taiga and subtaiga zones. Mean SCPs of these beetles decreased by 2 to 4 °C during winter. The differences between mean SCPs in summer and autumn were statistically significant (P <0.05). All the beetles examined were freeze-intolerant. These species probably overwinter in the supercooled state. *Carabus aeruginosus*, *C. regalis*, *Pterostichus drescheri*, *P. ehnbergi*, *P. dilutipes*, *Amara brunnea*, *Calathus micropterus*, and *Notiophilus reitteri* belong to this category. Most of these species reproduce in the autumn. It is known that a large volume of fat body and gonads increase cold resistance (Storey and Storey 1989).

In the third group, there is the northern tundra species *Curtonotus alpinus*. Beetles collected in different tundra subzones and in forest tundra in summer had low SCP temperatures of –5.5 to –5.6 °C. In autumn, the mean SCP was slightly higher than in summer, by about 1.0 to 1.5 °C, but these differences were not statistically significant (P >0.05). *C. alpinus* is the only species of ground beetle studied that is freeze-tolerant. Although *C. alpinus* is mixophagous, it is more prone to phytophagy, which may increase its tolerance to freezing (Block 1982b).

Coleoptera, Family Staphylinidae—The supercooling ability of nine species of staphylinids was measured. These species inhabit different landscape zones and subzones from typical tundra to subtaiga forest. All the staphylinids had relatively low SCPs in summer and ranged from –4.5 to –6.8 °C. In typical boreal species, such as *Quedius fuliginosus* and *Tachinus rufipes*, mean SCPs in summer were higher (–3.5, –4.5 °C) than those of northern and polyzonal species (–5.0, –6.5 °C). The main differences between northern species of the Staphylinidae and the more southern boreal species is in the type of seasonal fluctuations in supercooling ability. In the boreal *Quedius jenisseensis*, *Quedius fuliginosus*, *Tachinus rufipes*, *Oxypoda annularis*, and the widespread *Liogluta micans*, a distinct seasonal change in SCP was observed. Autumn values were 2 to 4 °C lower than in summer (P <0.05). All these species are active in summer and autumn.

In relatively northern species, such as *Atheta sibirica*, *Mannerheimia arctica*, and *Atheta*. (s. str.) *graminicola*, seasonal changes of SCP were not recorded. SCP values were rather low, even in summer (–6.2, –6.5 °C). These species probably overwinter in the supercooled condition. Only one specifically northern tundra staphylinid, *Lathrobium poljarnis*, was freeze-tolerant. As in the northern group of species, seasonal SCP dynamics were absent. Summer and autumn mean SCPs were relatively high: –4.8 and –4.6 °C, respectively.

Conclusions

Experimental data for arthropods demonstrate connections between the seasonal dynamics of their observed thermopreferenda and their distribution in habitats of the various landscape zones of the Transect. Species with a northern distribution have mean thermopreferenda and their main preferable temperature zone 2 to 3 °C lower than those of boreal species. Also, tundra species have a wider range of preferable temperatures than boreal taxa.

The thermal requirements of many of the species appear to be stable and do not change greatly over their entire distribution along the Transect. “Southern” boreal species, which prefer relatively high temperatures in the experiments, penetrate into the northern subarctic and arctic regions only via intrazonal boreal sites where the soil and surface litter are protected in winter by a deep snow layer.

A single important parameter reflecting the thermal needs of such arthropods is the seasonal fluctuations in their thermopreferenda. Northern tundra species, for example *Pterostichus pinguidineus*, *Curtonotus alpinus*, and *Lathrobium poljarnis*, do not exhibit significant seasonal changes in their thermopreferenda. Boreal species have two types of seasonal thermopreferenda connected with the timing of their activity during the year and physiological preparations for overwintering. Most boreal species prefer lower temperatures in autumn than in summer. For example, individuals of *Pterostichus ehnbergi*, *Carabus aeruginosus*, *Oxypoda annularis*, and *Tachinus rufipes* choose lower temperatures in autumn than in summer. However, several other species display an opposite tendency; individuals of *Amara brunnea* and *Quedius jenisseensis* preferred higher temperatures in autumn than in summer.

The supercooling abilities of adult beetles remain much the same throughout the area of a species distribution. Seasonal fluctuations in mean SCPs also appear to be species specific. The species of millipedes examined were all freeze-tolerant with no zonal differences in SCP. Most of the Coleoptera studied were freeze-intolerant and overwintered in the supercooled state. Only two species of Coleoptera were freeze-tolerant: *Curtonotus alpinus* (Carabidae) and *Lathrobium poljarnis* (Staphylinidae), both distributed throughout the tundra area of the Transect. Seasonal changes in mean SCPs of northern-distributed Coleoptera differed from those of boreal taxa. The boreal *Carabus aeruginosus*, *Pterostichus ehnbergi*, and *Quedius jenisseensis* show seasonal fluctuations in SCPs. In autumn, their SCPs are 2 to 4 °C lower than in summer. More northern species (*Pterostichus brevicornis*, *Carabus odoratus*, *Atheta sibirica*, and *Mannerheimia arctica)* have no seasonal changes in their SCPs.

These results suggest that there are no significant alterations in cold hardiness with the different climatic regimes along the Transect and that there is no special "northern" variety of cold hardiness in the species examined. Such data support the hypothesis of the importance of pre-adaptations in the survival strategies of such terrestrial arthropods in the Arctic environment.

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III. Human Values and Meanings of Wilderness

Traffic in India: scooters, oxen, bicycles, cars, and autorickshaws (photo by Alan Watson).

The youth of modern India (photo by Alan Watson).

Attachment, Change, and Displacement Among Winter Recreationists at Snoqualmie Pass

Berit C. Kaae

Abstract—Results of a questionnaire-based survey of 602 winter recreationists at Snoqualmie Pass in Washington State, U.S.A., indicate that recreationists' attachment to the recreation setting was based on memories of past visits, accessibility, and visual quality. The recreation activity was relatively more important than companionship and the area itself when recreationists chose the setting. In particular, mountain views and natural vegetation enhanced the visual quality of the area while timber harvest, power lines and light masts, and other man-made structures detracted from the visual quality. Many recreationists recognized changes in the recreation setting, such as development, clearcutting, improved access, and increased visitation. These changes affected the recreation experiences both positively by improved facilities, access, and management, and negatively through crowding, lower visual quality, and unwanted forest management practices. Crowding negatively affected the recreation experiences among cross-country and downhill skiers. The risk of displacement was very high and the main motives for displacement were crowding, expenses, more development, and forest management practices. Cross-country skiers were the most sensitive to displacement, while snowmobilers were the least likely to be displaced. In addition, attachment to the area, crowding, recognizing change, and knowledge of other recreationists who have stopped using the area increased the risk of displacement.

Recreation activities and experiences with the outdoors provide physiological and psychological benefits important to our well-being. Understanding recreation motivation and behavior is important to planners and managers of natural areas to ensure the provision of spaces and facilities for a variety of outdoor recreation experiences. One aspect of understanding the meaning and importance of wilderness is to examine how attached recreational users feel to natural settings and to which attributes or experiences the attachment is linked. In addition to their utility, public lands are objects of emotional attachment, and affective ties with a place or landscape are important to public land management planning (Mitchell and others 1993).

Some recreational settings are undergoing changes due to increasing visitor numbers and construction of additional facilities. These changes often affect recreational opportunities and visual qualities of the area. Consequently, it is important to identify how changes in recreation areas influence recreation experiences and enjoyment and how they influence susceptibility to displacement.

Recreation choice behavior is highly complex. Many factors may influence recreationist decisionmaking and choices of recreation setting (Christensen and Davis 1984). Some factors are related to the setting and some to characteristics of the recreationist.

Findings from outdoor recreation studies indicate that recreationists form attachments to sites and return to favorite or preferred places repeatedly (Clark and Downing 1984) but also use other acceptable places for similar outings. Access is a key factor in recreation choice and use of an area. Favorite areas are frequently more remote while most-visited sites are usually more accessible and convenient, and they provide for specific activities or facilities.

Most models of recreation choice behavior consider characteristics of the recreationists, such as socio-demographics (Harris and others 1984) and lifestyle group (Schreyer and others 1984), while McCool and others (1984) focus on sociological factors as being critically important to understanding recreation choice. Gender differences in perception of leisure were identified by Williams and Lattey (1994) who found that women place greater emphasis than men on the emotional and social dimensions of skiing and less on the physical and challenge-seeking aspects of the activity.

Past experience has been found to influence recreation choices (Hammitt and others 1989; Watson and others 1991). Childhood experiences also influence choices, as recreationists tend to use places similar to those used as children (Clark and Downing 1984). Skill level was found to influence skier choices with more advanced skiers more critical of skiing facilities and favoring resorts with more challenging runs (Richards 1996). As skiing skill levels in the population has generally increased, quality of the ski areas has become increasingly important to managers.

One aspect of the choice process is related to the selection of activity, setting, and companions (Mitchell 1988; Williams 1984) and how the importance of these factors may vary. As described by Clark and Downing (1984), recreationists have favorite activities, favorite places, and favorite people with whom they recreate. However, they often compromise in making recreation choices because the preferred choices may be constrained by factors such as group needs, timing, and individual taste differences within the group. The relative importance of activity, setting, and companions in the choice of recreation setting is relevant to area planners and managers. Similarly, Vining and Fishwick (1991) found personal values and experiences, site features, and activities to be important in the site choice process.

In: Watson, Alan E.; Aplet, Greg H.; Hendee, John C., comps. 2000. Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management, and allocation, volume II; 1998 October 24–29; Bangalore, India. Proc. RMRS-P-14. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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The influence of changes in the recreation settings on choice has been addressed by Allen (1984). Changes may be related to physical and social conditions, such as crowding, that reflect the experienced influence of the density of visitors rather than visitor density itself (Isa-Ahola 1980; Shelby and others 1989) or problems with compatibility of new recreation activities in the same setting (Williams and others 1994). Some recreationists may be more aware and sensitive to changes than others. According to Clark and Downing (1984), recreationists appear to vary in their threshold of disruption and in their willingness to adapt to undesirable changes in a place. When a favorite place undergoes changes it may lose the qualities perceived by the recreationists who will have to seek out compensatory settings within the recreational "home range" (Clark and Downing 1984). Robertson and Regula (1994) found a relationship between satisfaction with recreation experiences and reduced and discontinued use of the recreation area. This issue of substitution in recreation choice behavior has been addressed in a number of studies (Clark and Downing 1984; Peterson and others 1984; Shelby 1984; Williams 1984).

The purpose of the study reported here was to examine recreationist attachment to a recreation setting, the visual perception of site attributes, the perceived changes in the recreation setting, and the effect on recreation experiences, as well as the extent and motivation for displacement.

Methods

Study Area

The study was conducted at Snoqualmie Pass, a popular winter recreation area located in a National Forest area of the Cascade Mountains, 1 hour east of Seattle, Washington, U.S.A. The pass contains four downhill ski areas of diverse skill levels, a number of trails for cross-country skiing, and trails for snowmobiling. Some trails are shared between cross-country skiers and snowmobilers. The pass is the closest winter recreation area to Seattle and is accessible by Interstate 90, a major transcontinental freeway, creating easy access from both sides of the pass. Consequently, a rather diverse group of winter recreationists were expected to be found at Snoqualmie Pass in comparison with other areas requiring more specialized skill levels and longer travel time.

Methods

Responses from winter recreationists were obtained through an on-site questionnaire at ski lodges and trailheads within the Snoqualmie Pass area. Of 680 recreationists approached, 667 participated. Of the 667 questionnaires administered, 602 were completed, resulting in a 90.3 percent effective response rate. The responses included 319 downhill skiers, 203 cross-country skiers, and 40 snowmobilers, while 40 respondents participated in other snow activities. The sample is believed to represent the proportional number of the winter user groups in the area, although snowmobilers may be somewhat under represented because the trailheads for this group were at slightly lower elevations and "melted out" at the end of the 6 week survey period.

In addition to quantitative questions on use patterns, socio-demographics, and other background factors, the questionnaire included a substantial number of open-ended questions for qualitative reasons. Additional qualitative research is advocated by Vining and Fishwick (1991) to identify underlying factors influencing recreation choice.

Results

Attachment to Area

Snoqualmie Pass provides the closest access to winter activities for the Seattle area (about 1 hour away) while several larger and more challenging ski areas are located 2 to 3 hours' drive from the city. The tendency to compromise in the choice process, identified by Clark and Downing (1984), was found in only around half of the recreationists as 57 percent considered Snoqualmie Pass their first choice. Close proximity and easy access were stated as the primary reasons why Snoqualmie Pass was chosen over other areas. However, results also show a relatively high level of attachment to the area because 43 percent of the recreationists felt that Snoqualmie Pass was in some way special to them. Fifty percent of those who selected Snoqualmie Pass as their first choice felt attached to the area, while only 31 percent of those not considering the area their first choice felt attached. Level of attachment to the area was not different across activity groups, lifestyle groups, or gender. However, level of attachment was found to increase with the number of years of visitation.

Recreationists who felt the area was special to them were asked to describe how the area was special to them. Categorization of the diverse answers (fig. 1) indicates that attachment was strongly linked to memories, including childhood or youth experiences, learning to ski at the area, special times with family and friends at the pass, and familiarity with the area. Accessibility and visual quality (in particular, the views of the mountains) were also important attachment factors. The suitability of the physical environment to the recreation activity was somewhat important, including the variety of options available.

In addition to the overall attachment to Snoqualmie Pass, three out of four recreationists (77 percent) could identify a favorite site within the pass area. Reasons for the sites being favorite were primarily linked to enhancement of recreation experiences by the sites being well suited to skill level, attractiveness of site features, excitement gained from the recreation experience, and the social atmosphere (fig. 2).

Relative Importance of Area, Activity, and Companionship in the Choice Process

The recreation activity was the most important contributor to site choice (48 percent), companionship was second (29 percent), and the area, third (23 percent).

The relative importance of area varied significantly across activity groups; snowmobilers prioritized the area higher in the choice process than the two types of skiers (fig. 3).

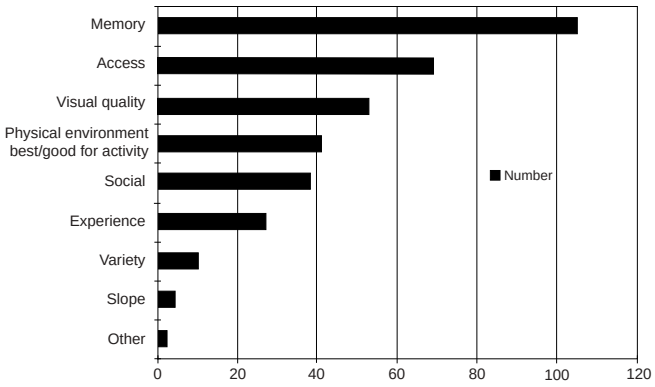

Figure 1—Open-ended responses categorized into main types of attachment to Snoqualmie Pass.

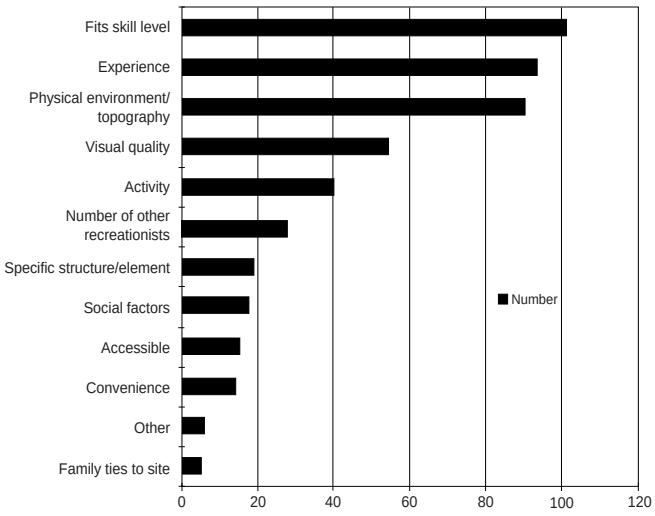

Figure 2—Specification of reasons for favorite site within the Pass.

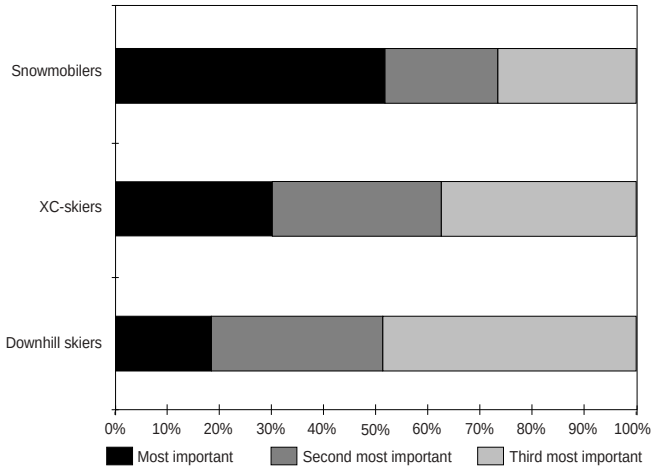

Figure 3—The relative importance of activity in the choice process by observed activity type at Snoqualmie Pass.

Also, a gender difference was found: men placed relatively higher importance on activity in site situations than did women. Activity was the most important to 58 percent of the male visitors compared to 47 percent among female visitors. In contrast, women found companionship to be of relatively higher importance (37 percent) than did men (27 percent). No significant gender difference was found for the importance of the area in the choice process.

Visual Perception of Site Attributes

The natural mountain setting at Snoqualmie Pass has experienced a number of changes over the years due to expansion of road access and recreational facilities. The visual perception of these changes influence the recreation experience. In evaluating the visual perception of site attributes at Snoqualmie Pass, recreationists perceived that the scenic beauty related to natural vegetation and the mountain very positively, while timber harvest, power lines, and light masts, as well as a number of other man-made structures were found highly unattractive by recreationists (fig. 4).

Perceived Changes in the Area

A majority (60 percent) of the respondents had noticed changes in the area during the number of years they had visited Snoqualmie Pass. The main types of changes identified by recreationists were development, clearcutting, increased number of people, improved access, lower visual quality, and changes in management and services (fig. 5).

The perception of change was found significantly linked to years of visitation, summer visitation, age of respondent, childhood visits, frequency of visitation, and type of activity. Snowmobilers more frequently noticed changes (77 percent) than cross-country skiers (64 percent) or downhill skiers (54 percent). This may be due to the larger areas covered by

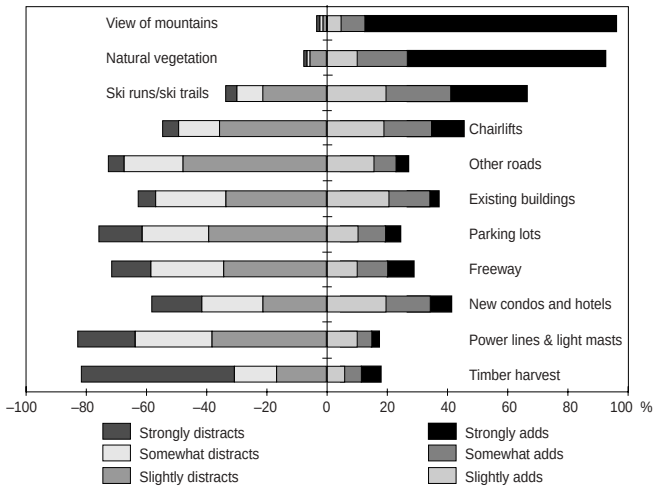

Figure 4—The perception of factors influencing visual quality at Snoqualmie Pass (negative percent indicates distraction from visual quality, while positive percent indicates addition to visual quality).

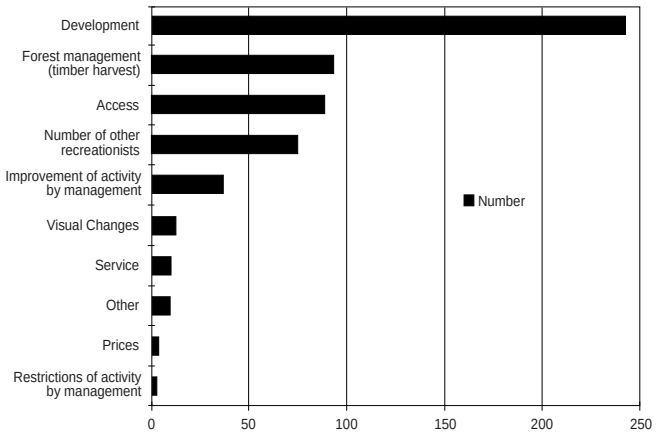

Figure 5—Types of changes noticed by recreationists at Snoqualmie Pass.

snowmobilers, and to some extent cross-country skiers, than by downhill skiers.

Among the recreationists who had noticed changes, about half (52 percent) felt the changes had affected their recreation experience. The main negative impacts on recreation experiences were crowding, deterioration of visual quality, forest management practices (especially timber harvest), and changes in use patterns made in order to adjust to changes. Other changes such as facility development, management of lifts and trails, access, and the quality of the experience had primarily improved the recreation experience (fig. 6).

Perceived Crowding

At Snoqualmie Pass, more than half of the recreationists (53 percent) felt the number of other recreationists to be appropriate. About one-third (35 percent) felt there were too many visitors, and one in 10 (11 percent) felt there were far too many visitors. Very few (2 percent) felt there were too few, or far too few, visitors. According to Shelby and others (1989), the 46 percent of recreationists feeling crowded is within the normal range in recreation settings.

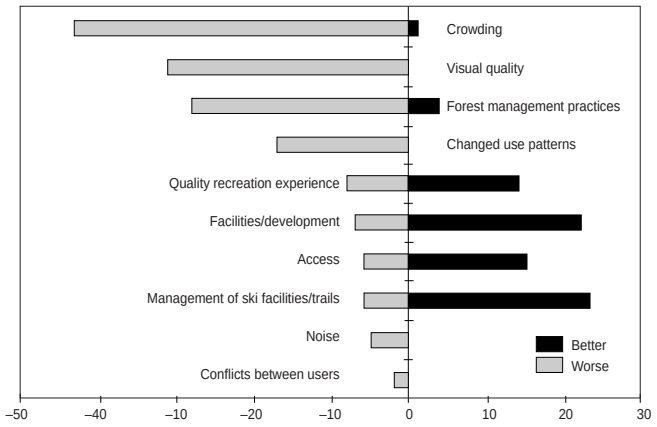

Figure 6—Types of changes impacting the recreation experiences of respondents.

The perception of crowding did not differ among activity groups, confirming findings of Shelby and others (1989). Neither were any differences found in relation to lifestyle groups or gender of the recreationists.

Less than half (40 percent) of the recreationists felt that the number of other recreationists influenced their recreation experiences. The influence on enjoyment was particularly felt by cross-country skiers (47 percent) and downhill skiers (40 percent), while significantly fewer snowmobilers (13 percent) felt affected. This confirms the asymmetrical experience of impacts often reported in outdoor recreation literature. The influences on enjoyment experienced by recreationists were primarily irritation by the speed or skill level of other recreationists, noise, littering, vandalism, overuse of snow, traffic to the area, and lack of courtesy by other recreationists.

Displacement

The risk of displacement was very high among visitors. More than half (55 percent) of the recreationists considered leaving the area themselves and one in six (17 percent) of the recreationists knew people who had stopped visiting Snoqualmie Pass. Cross-country skiers were most likely to be displaced, as two-thirds (66 percent) considered leaving, compared to half of the downhill skiers (50 percent) and one-third of the snowmobilers (31 percent) (fig. 7).

Knowing others who have stopped using the area and their motivation for stopping may influence one's own risk of displacement. The motives identified by recreationists for why their friends had stopped visiting Snoqualmie Pass were crowding and to seek more challenges for the activity (fig. 8). The recreationists' own reasons for considering leaving Snoqualmie Pass were crowding, increased costs, more development, and forest management (in particular timber harvest) (fig. 9). While both groups identified crowding as the primary motive for displacement, seeking new challenges for the activity was a more important motive among friends than among the recreationists themselves who still use the area and most likely still find it challenging. Seeking new challenges cannot be characterized as true displacement because it is voluntary.

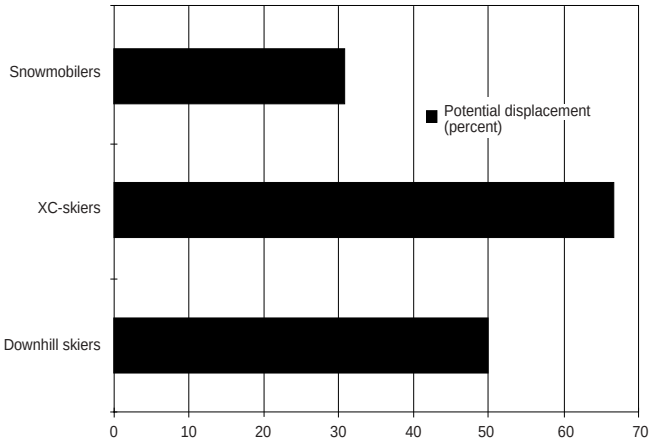

Figure 7—Respondents who have considered not visiting Snoqualmie Pass.

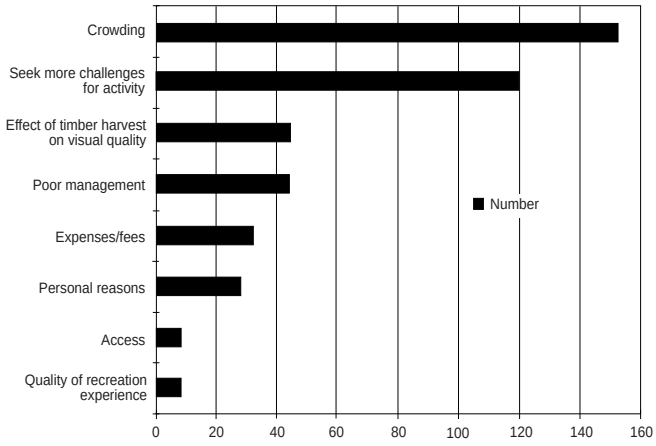

Figure 8—Reasons why friends have stopped using Snoqualmie Pass.

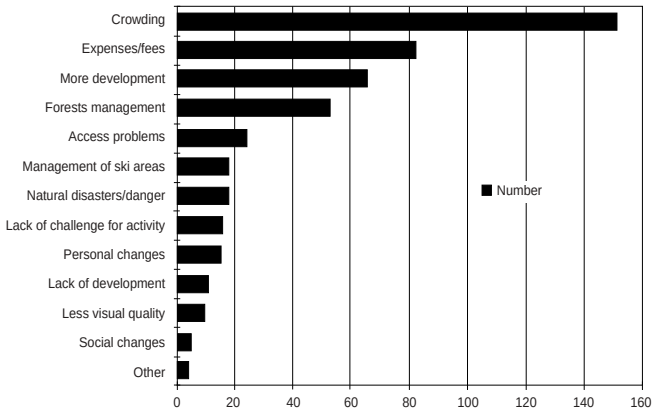

Figure 9—Reasons why respondents would stop using Snoqualmie Pass.

Motives for Displacement

Recreationists feeling attached to the area were more likely to be displaced (60 percent) than those with less attachment (51 percent), while the risk of displacement was unaffected by recreationists having a favorite site within the pass. Recreationists who had noticed changes in the area were more likely to be displaced (64 percent) than those who had not noticed changes (41 percent), and those who felt their recreation experiences were affected by changes were more likely (72 percent) than those unaffected (55 percent) to be displaced.

Recreationists who experienced crowding were more likely to leave (60 percent) than recreationists not experiencing crowding (50 percent), and recreationists who felt that crowding affected their enjoyment were more likely to be displaced (66 percent) than those who felt that crowding did not affect their enjoyment (47 percent). Recreationists knowing people who have stopped using the area were more likely (81 percent) than others (49 percent) to be displaced. This indicates a high importance of social aspects and companionship in displacement.

No significant difference in displacement was found in relation to gender, years of experience in the activity, childhood visits, or recreationists having Snoqualmie Pass as their first or second choice of area. Nor did displacement differ in relation to the relative importance of activity, area, and companionship in the recreationists' choice of the area.

Discussion and Conclusions

Attachment to the recreation setting was found to be linked to site features and visual quality of the setting itself, to the close proximity of the recreation site to the residences of the visitors, and to experiential benefits gained from past visits in the area. Current recreation experiences and desirable social interaction also contributed to attachment. Attachment to a favorite site within the recreation area was activity-specific and primarily linked to suitability to skill level, attractiveness of site features, excitement of past experiences, and social atmosphere. This suggests scale differences in attachment to recreation settings.

As indicated by Mitchell (1988) and others, activity, setting, and companionship were important factors in the choice of a recreation setting. However, the recreation activity was found to be relatively more important than companionship and the area itself when recreationists chose Snoqualmie Pass. The relatively low importance of the area itself is not surprising because more challenging and visually spectacular ski areas are found within the State but at a farther traveling distance. The higher importance of the area to snowmobilers than to skiers may be due to fewer alternative recreation sites and that snowmobilers cover larger areas within the recreation site than skiers.

The high visual preference for mountains and natural vegetation, and the visual detraction by timber harvest and man-made structures, should make area planners and managers more aware of the design and location of future facilities and of the need for less intrusive timber management practices in recreation settings and viewsheds.

Many recreationists recognized changes in the recreation setting, particularly development, clearcutting, managed access, and increased visitor numbers. Changes affected the recreation experiences both positively by improving facilities, access, and management, and negatively through crowding, lower visual quality, and unwanted forest management practices. This underlines the importance of taking recreational activities and preferences into consideration when changing facilities or management practices. Integration of planning and design of new facilities may help reduce some of the negative changes in recreation settings, including addressing negative effects of inter-activity conflicts.

The risk of displacement of recreationists from Snoqualmie Pass is very high and is linked not only to changes in visitor experiences and economic conditions within the recreation setting itself but also to the visual effects of clearcutting in surrounding areas. This study supports the links between satisfaction with the recreation experience and displacement (Robertson and Regula 1994). This underlines the influence of management actions within the recreation setting, as well as forest management practices in areas outside the recreation setting itself, on the experiences and leisure satisfaction of visitors. Improvements in management and visual quality of the area may help reduce the displacement of recreationists at Snoqualmie Pass.

Sensitivity to displacement was found to vary with several factors. Cross-country skiers were most sensitive to displacement while snowmobilers were least likely to be displaced, suggesting an asymmetrical conflict relationship. The risk of displacement was higher among recreationists who felt attached to the area, recognized changes in the areas or effects of changes on their recreation experiences, and experienced crowding or effects of crowding on their recreational enjoyment. Knowledge of people who have stopped using the area increased the risk of displacement, which indicates a high importance of social aspects and companionship in displacement.

Acknowledgments

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Sojourning: A Specific Wayfaring Metaphor Related to Environmental Ethics

"Journeys bring power and love back to you." (Rumi)

Karen M. Fox
Gordon Walker
Leo H. McAvoy

Abstract—Current trends in traveling to wilderness areas, observing vanishing species and ecosystems, and participating in challenging activities draw their foundations from a historical context of adventurers and explorers, Grand Tours, and romantic solitary travelers. A metaphor of sojourning is presented that provides an interpretation of wilderness travel related to ethical action and political power structures. Initial discussion looks at four guideposts related to sojourning that include a sojourning mindset, a process of self-reflection, inclusion of all living entities, and political action. Portions of the manuscript set off by [ ] reflect the authors' reflections and experiences that support an integration of experience and theory related to sojourning.

[It was a warm, sunny day as we hiked up to Spirit Lake not far from Quetzaltanango. First, we wandered through a village of one-lane roads; our presence spread like wildfire through the small village. Although feeling better about our Spanish, it was useless since Spanish is often a second language for the Mayan villager. Nevertheless, they would say a few things and point to the direction of the lake. At the edge of the village, we began to hike into the lush forests of Guatemala. Deep, deep greens, large, broadleaf plants that create light patterns enclosed around us. Periodically, we would pass the fields of farmers pushing further and further into the forest. Occasionally, there were patches of 'slash and burn' to remind us of the destructive farming practices of people with no resources. As we passed these fields, children would often ask for food, and I was down to a mango by the time we stopped for lunch. When we reached Spirit Lake, I wandered off to experience a moment of solitude that I often associate with wilderness. A small path just ten feet from the waters edge, but hidden from view by the vegetation, circled the lake. It was small and I could be around it before the others would want to go back. I walked casually just drinking in the silence, the sense of aloneness, the difference. Without warning, the young soldier stood before me with his machine gun held ready for action. The young men taken from the bus between Guatemala City and Quetzaltanango appeared in my mind. "Pasaporte! Pasaporte!" he ordered. Fortunately, I had mine, handed it over, and was careful not to look too long in his eyes. After some long minutes of him looking at each and every page, he handed it back and was gone. I stood there shaking, absorbing the shift in my own consciousness of the word, wilderness.]

Sojourning

As three travelers from North America, we are committed to protecting those lands labeled special places, wilderness, protected areas, and national parks. And yet, we are increasingly aware of the multiple meanings associated with these lands, the contradictory forces of benefit and harm they set in motion, and the emergence of paradoxical contexts requiring ethical action. We feel an urgency to elaborate alternative accounts, to learn to think differently about wilderness, to invent other frameworks, other images, and other modes of thought, especially in the light of the destruction of wilderness, the challenges that lay before us, and the possibility of collaborative successes. This paper represents our explorations into the meaning of these places, our ethical obligations to those places, and our struggles to enact our values. We are convinced that we must find varying ways to address the ethical issues related to the protection of wilderness and the relationship of humans to wilderness. The metaphor of sojourning has helped us look more critically at our own world views, actions, and ethics. We would like to focus on the present with awareness of the past and an eye to the future and creatively play with a sojourning metaphor that may hold us accountable for our heritage and lead us to new relationships and ethical actions. Is it possible, in the face of complexity and uncertainty, to construct theory and practices that are mindful? We hope so, but believe careful attention must be paid to the contexts in which seemingly isolated elements occur.

This paper is multilayered and emanates from our work separately and collectively. Perhaps as we stand along the edge, like a sojourner, who has lived among multiple places and peoples and can no longer claim one singular identity, we will sense the tensions, the paradoxes, the possibilities, and the ongoing rhythms necessary to live in multiple worlds and layers. The sojourning metaphor focuses on a dynamic nexus involving self, wilderness, movement, ethics related to people and places, and political action. From our perspective, sojourning is one metaphor related to sustaining wilderness and forms of movement that are respectful to

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other cultures as well as to wilderness (including, but not limited to, wilderness, national parks, oceans, atmospheres, wild animal parks, and marine parks). We draw upon insights from postmodern philosophy, critical and radical feminist theory, and literary criticism.

We argue that wilderness is not a simple designation of a physical space. The metaphors and descriptions of wilderness carry with them the history of early explorers' search for "new lands" and "uninhabited regions." These explorers often conceived of the "new" lands and people in their own images, and their journals left invisible the value, attributes, and spirit of the places and people they encountered. Many outdoor participants from Euro-North American traditions create similar patterns as they discuss their exploits and self-learning, but not the details and characteristics of the flowers, trees, animals, soils, and people within and around wilderness areas.

Wilderness, therefore, is a contested space. Wilderness is intimately connected with nation-building imagery, colonialistic practices, sociocultural forces, and oppressive structures. Orlie (1997) argues that all actions contain the seeds of benefit and harm. So, the wilderness movement has also spawned ripples of benefits related to ecosystem protection, animal rehabilitation, and cultural symbolism, while other ripples lessen agricultural lands, maintain dualistic relationships between humans and nature, or divide the "haves" from the "have-nots."

According to the Oxford English Dictionary, sojourn implies a temporary stay in a particular location. A sojourner is a guest, temporary resident, visitor, or boarder who lives in a house, school, or college for the purpose of receiving instruction. A sojourner travels lightly, resides temporarily in an area, learns from others, and shares talents and energy. A sojourner has the time and inclination to connect viscerally with the world around him or her. Although sojourning may imply resources of time and money, sojourners also make deliberate decisions to travel lightly and to be dependent on their own resources on a daily basis. Sojourning can describe an individual with no set agenda except to learn where s/he is and about the people and places s/he visits, or sojourning can imply a mission or purpose associated with the travel. Therefore, sojourning includes decisionmaking moments where the individual makes choices and demonstrates cultural perspective through actions taken. Sojourning is chosen as a metaphor to suggest a temporariness of location and to indicate even with a purpose, there is a willingness to learn and change.

Sojourners search for new understandings of self and answers to what Shweder and Bourne (1991) contend are basic existential questions for all individuals and societies, including:

1. What is the relationship between the individual to group, to society, and to the collectivity?
2. How do we address the ethical issues related to the "haves" and "have-nots?"
3. What is the meaning and relationship between nature and culture?
4. How do we decide to live in a specific way and why should we live this way and not some other way?

The last question, "Why should I live this way and not some other way?" is particularly important to the sojourning metaphor because it begins to examine the issue of whether an individual accepts the answers his or her society provides. Arguably, because of the economic wealth of the Western world, and in the case of Canada, Australia, New Zealand, and the United States, the relatively short time these societies have had to develop "acceptable" answers, individuals residing in these countries may be both more able and more likely to travel to other societies in an attempt to discover alternative responses to these existential issues. Sojourning, therefore, seems to be closely aligned with exploration of the self through "Other." (The use of the term "other" denotes people who are usually not included in, made visible by, or considered marginalized by the dominant Euro-North American world view. We have deliberately chosen this term to emphasize the baggage we, as Euro-North Americans, must continually address and the current power realities of today's world.)

The exploration of self through "other" is, however, a difficult one fraught with hidden traps; centuries of metaphors, analogies, and descriptions; and generations of philosophical and psychological baggage. The maintenance of an identity, yet permeable and open to the world surrounding the sojourner, is the main focus of the sojourning metaphor and provides the basis for ethical action. The concept of self or selves and subjectivity for a sojourner must be a concept that opens the individual or "limit-experience" to the world. (Limit-experience refers to the process of the limitlessness of the universe as it makes itself visible in discrete and specific phenomena such as people, animals, trees, and ecosystems (Orlie 1997)). The sojourner must know his or her story but be opened to the world and others writing upon the story and reinscribing the story.

The appeal of a sojourning metaphor is that it encompasses self-reflection that may disclose the value of movement as well as the potential for harm as played throughout the history of imperialistic and colonialistic travels. Beginning with ourselves, we are privileged in terms of choice and travel and choose sojourning as a vehicle for critique and accountability of our roles and responsibilities. Sojourners move from belonging to solitude, from solitude to belonging. Often, the sojourner moves in areas of silence, struggling to understand a new environment or culture.

> [We had just moved and I had met no people my own age. I began to aimlessly wander out into the Sonoran Desert that surrounded my grandmother's home. At first, it was a wasteland to me, and I could only focus on the friends I was missing. I don't remember what first captured my attention. Whatever it was, I soon found myself asking my grandmother's friends questions about the desert, reading the books they lent me, and spending hours focused on the desert around me. The trap-door spiders, the small sidewinders, and the barrel cacti became the primary focus of my long walks. I could spend hours tracking small animals, watching the lizards play, and identifying the different desert plants. The highlight of the summer was the one night, beneath a moon only half full, when a small coyote walked beneath the tree I was perched upon. There were no friends who would be interested in these experiences, and they soon were hidden in silence. Now, years later, I know that I physically change and relax when I go "home" to the Sonoran Desert.]

A sojourner creates and nurtures selves that may be contradictory, bridge dichotomies, or breach divisions. Some parts of individual selves may be incompatible with attributes

of another self. Although an individual can reveal who he or she is through words and deeds, in the end, what the individual is cannot be known. The act of sojourning, interacting and learning from others, allowing oneself to be changed by others and the world, and self-reflection are the intimate realities of a sojourner. What the sojourner is, is contingent, changing, and finally, simply an analytic distinction.

Guideposts for Sojourning

The following discussion centers around four guideposts that reflect the processes associated with the sojourning metaphor and may assist sojourners to move ethically within the world. These are not step-by-step procedures or instructions, but initial and tentative discussions of issues, values, dispositions, and compass points for a journey through the world in support of sustaining wilderness (in all its forms). Furthermore, the comments reflect our own experiences, travels, and self-critiques while exploring the relevance of a sojourning metaphor.

Sojourners Are Willing to Move Through the World Attuned to Ethical Questions

Sojourning begins with a mindset directed toward opening oneself to the world. As the sojourner makes decisions, he consistently addresses ethical implications of the decisions, such as: How will this impact the environment? What are the social justice issues involved in this decision? Nelson (1998) discovered it was not easy to travel ethically, because many of the very experiences she traveled for were destructive. So, visions of "trekking" through traditional villagers and avoiding "tourist traps" gave way to more difficult and thoughtful movements related to where tourist endeavors support local economies, or events are implemented by local organizations. Nelson suggests that traveling off the tourist track can be ethically questioned because of the complexities of economics, the basic survival needs of communities, and the manipulation of tourism for "ecological benefits." Therefore, sojourning requires time and space to develop intimate relationships and creates a recognition of plurality (for example, alternative ways of being without us) and natality (for example, energies for alternative ways of being within us). Changing who we are is not easy and takes considerable discipline, will, and patience. Silence can be the time to embrace the frameworks and "sense" of the changes or to decide on new paths of action.

> [My pre-sojourning perspective of the relationship between humans and nature was largely shaped by two events: (a) the one week each summer I spent on my aunt and uncle's farm while my father helped with the harvesting, and (b) the Sunday afternoons I spent at a more-than-rustic but less-than-modern cottage owned by the same aunt and uncle after they sold their farm. The former, not surprisingly, led me to view nature in terms of economic utility. For example, by altering the landscape, "nonproductive" land which was only good for waterfowl could be "re-claimed" so as to produce a cereal crop. Similarly, time at the cottage was both a time to rest, relax, and rejuvenate for the workday that followed, as well as the opportunity to demonstrate a certain status level; that is, as a member of the cottage class. It was not, in fact, until I was in my early twenties that I began to wonder about how other societies, and members of other societies, viewed nature. Once again, an alternative answer was found away from home, this time in New Zealand. It was there that I was first exposed to "tramping" or multi-day, self-supported excursions in natural areas. It was also there that I came to view nature in an interdependent manner. This experience—and the discovery of another answer to the existential question of the relationship between culture and nature—was critical, I believe, in my decision to pursue nature-based leisure not only in my personal life, but in my academic life as well.]

Sojourning, therefore, is a form of movement that requires the individual to actively pursue ethical interpretations of the events and actions occurring in the world. The existential questions posed by Shweder and Bourne (1991) plus ethical questions related to environmental protection, the welfare of wildlife, and social justice are primary points of departure for silence, reflection, and interpretation for the sojourner.

A Sojourner Is Willing and Committed to Processes of Self-Reflection that Support Growth and Accountability for One's Place in the World

Various scholars (Cuomo 1998; hooks 1994; Lugones 1990; Warren 1996) have argued that oppressive practices have common structures and are interconnected. The various forms of oppression cannot be easily separated, nor does ethical action in one area determine ethical action in another. It is not uncommon to see concern for the natural world coupled with misanthropic or otherwise harmful ideologies. (The primary and most extreme evidence to support this statement is the German Socialist Party, which supported protection of natural spaces while slaughtering millions of Jewish people [Cuomo 1998]. We would suggest that there are other more prevalent and less dramatic examples. For instance, many Euro-North Americans often support the existence of large parks and organized treks and safaris while ignoring the poverty of local economies or the waste in their daily lives.) The central issues at stake, within the sojourning metaphor and related to people from heritages connected with imperialism, colonialism, and socioeconomic power, are how to avoid the repetition of exclusions of previous travel practices (such as imperialistic or colonialistic movements) in the process of legitimating an alternative. How does the sojourner from dominant cultures avoid hegemonic recodification? How does a sojourner keep an open-ended view while asserting the political and the theoretical presence of another view of wilderness? The absolute answer is you cannot avoid the harms or create actions without both positive and negative consequences. The existential answer moves ethical sojourners to engage the world, carefully assess the phenomena, make thoughtful decisions and actions, and open oneself to the outcomes and ripples of the initiations. The process of self-reflection includes time and space for contemplation, systematically exploring ethical questions, obtaining knowledge about perspectives critical of one's own world view, values, and decisions, and a disposition to changing oneself.

The energy for the sojourning and the hints of new directions comes from moving back and forth between intellectual critiques, personal experiences and reflections, perspectives different from the sojourner's, and knowledge of daily resistant practices against all forms of oppression.

> [The roles between white and black, student and professor, Euro/North American and African were fascinating to me during the trip up Mt. Kenya. Since I had a pack that was of a better design than most of the Kenyan students, I was probably carrying the heaviest and largest load, especially on the section above our base camp. Most of the other groups going up the mountain were white Europeans/North Americans, who all had hired Kenyan porters to carry their packs while they walked up with day-packs. The students in our group were at first upset that I was carrying the heaviest load, and offered repeatedly to carry my pack. But, maybe my carrying my own load and then some was part of an effort on my part to reverse some of the trespasses that whites had inflicted on Africans in the past, a way of reversing some of the power abuses of the past. Seeing the hired porters working at low pay hauling up packs for customers probably kindled a realization of history and cultural forces we as whites carry around with us.]

Sojourners Respect the Life of All Species

Cuomo (1998) suggests that flourishing is an appropriate concept to apply to the variety of entities in the world, including people, societies, animals, and ecosystemic processes. Flourishing occurs when our values and decisions do not center solely on our interests and contributes to the eudaimonia (or happiness, good life, living well, flourishing) of ourselves and others. Flourishing occurs in bodies and describes a process. It is achievable by individuals only in communities and aggregates; requires good consequences, integrity, self-directedness, deliberation, choice making, and some autonomy. Flourishing also captures something about who we want to be.

> [I wasn't exactly afraid of the snakes, but I wasn't fond of them either. I believed snakes had no personality. I knew that "fact," even though I had never spent any time with a snake. The little baby Fox Snake's name was Chakra. She appeared one day in our interpretive centre. As I spent time watching Chakra, I became more intrigued. Fox Snakes are extremely active and curious; she was constantly moving about and exploring; every new item in her area was investigated thoroughly through moving over and around, "tasting" it, and eyeing it closely. I almost lost her among the bone collection when I decided she needed a larger area to explore. Over the months, I found that I could tell when she was more curious, more interested, or frightened of our student groups or individual interpreters. I have long since moved away from that area, but when I return I always visit her and ponder what it means to have a Fox Snake for a friend. I do not know if she would have been better in the wild, but I would have been poorer.]

The sojourner's commitment to flourishing requires him to look at all affected individuals, groups, species, and ecosystems. This is sometimes very difficult as primary values and concerns related to wilderness areas and addressing human poverty seem to conflict or undermine the actions connected to one or the other. However, all of our concepts of nature, wilderness, special areas, and parks are constructed upon the cultural contexts they originated from, and such frameworks hold the seeds of promise and harm.

> [Our group spoke with the manager of the National Park. He told us that one of the major challenges he faces in managing this wilderness is that most visitors are white tourists. The residents of the local communities seldom visit the park. But their small garden plots are often visited by large park mammals who leave the park, feed on and trample their crops. The region bordering the park used to be quite wild and uninhabited. But, the growing population in the country has forced people to now be living and trying to farm adjacent to the park. This park-versus-local-residents conflict sparked lively discussions among our group around the campfire that evening, and gave me a clearer picture of the fragile existence of wilderness in developing countries. The discussion extended to issues of the size of families, the African tradition of large families to ensure family survival, how all this relates to population growth, and the need for economic growth and resource development. It also gave me some realities of the politics of hunger and bare existence in a cultural and human context. It made my argument for the existence of wilderness seem a bit hollow and idealistic at times, and made me more concerned about the cultural impacts.]

A sojourner's commitment to flourishing requires some understanding of the perspective of the "other." To engage the "other" requires a sojourner to distinguish between speaking for another, appropriating another's voice, and skills, such as Arendt's "visiting" (Honig 1995), Lugones's (1990) "playful traveling," or Willet's (1995) engagement of the proximate other. Arendt describes the precarious balance required to engage or understand another perspective: the sojourner must preserve his or her own thinking while incorporating the perspective of another's body, mind, and world view. Ethical thinking and action should not result in the obliteration of the sojourner as s/he seeks to think from the vantage of another, to respond to the perspectives born of another being, and to measure up to the relation of the sojourner to the other. Such a process often calls for changing who the sojourner is becoming. This thoughtful interaction offers the possibility of mixtures of selves, bodies, minds, and entities, thus transfiguring what they appear to be, as well as who they are becoming (Orlie 1997).

Sojourners Are Committed to Changing Themselves and Working Collaboratively to Change Groups, Systems, and Collectivities

Meaningful changes in perspective require material interaction and political action. The metaphor of sojourning requires sojourners to make alterations in their minds/bodies/spirits, how they live, and in the systems around them. As each individual, society, and collectivity answers the existential questions, they structure their political communities. A sojourner works to make visible the plurality of the answers. From a communal recognition of this commonality of existential questions and plurality of answers, new possibilities for respect, collaboration, and hope appear.

When sojourners become responsive to others' claims about their effects, sojourners may disrupt what they are predicted to be and redirect the world to more respectful

actions. Such responsible actions may evoke forgiveness of the associated harms within any action from lack of understanding or incomplete knowledge. Forgiveness is evinced by a commitment to act together, and by the valuable willingness of those who have reason to resent the sojourner's presence to engage them nonetheless as political friends. Sojourning processes are structured around principles that emerge in the course of action and despite the oppressions that separate while bringing people together. Paradoxically, only enactments of principles that affirm their limits or partialities sustain the idea of universality and guard against affirming the partial as if it were universal. Harm or trespasses originate when individuals or societies conceive and live their partial understanding as if it were universal. To a degree, this habit is unavoidable; finite beings cannot encompass the infinite; and sojourners must affirm the limited or partiality if they are to love, and not despise, the world. The challenge, then, is to experience traces of the whole within the limits. At least sojourners must do so if they are to do justice to the trespasses entailed by their finitude.

> [On the Mt. Kenya trip, I found myself at times thinking of the model of solitude so prevalent in American wilderness writers and philosophers. I often visit wilderness in the United States by myself seeking this solitude experience. The metaphor I often conjure up in my head is myself alone interacting with the wilderness. Wilderness is a place where I go to seek the peace of solitude I find so difficult to achieve in my other life. Solitude is not a viable model or metaphor in the African culture, and probably not in other developing, agrarian cultures. In developing, agrarian cultures like Kenya, the group or the community is all important. The country is too harsh for people alone. It is too dangerous. It is too difficult for one person alone to survive. And, most Kenyans do not have the economic standing to be able to afford the luxury of going it alone. The community, the family, are important to existence and to continuing the health of the community.]

Conclusion

We have attempted to explore the metaphor of sojourning while keeping in mind the cultural heritages and power structures inherent in our own positions. We suggest that the sojourning metaphor opens new areas for ethical and political discussions related to wilderness areas. In our explorations, sojourners divagate between official cacophonies of cultures, while struggling to resonate with the rhythms of daily life, ordinary people, and their own emerging selves. Sojourners flirt with a committed, but temporary, relationship to a more rooted community. They tentatively construct a radical non-belonging and outsidedness, as they connect with others. Sojourners must be able to recreate a home or place of living everywhere. Sojourners are able to choose to write cartographies or intellectual landscapes that provide frames of reference for bearings and places to set up a tent as they move between worlds, cultures, ecosystems, and beliefs. Each story or journal entry or momentary identification is like a camping site: it traces where the sojourner has been in the shifting landscape of wilderness, culture, individuals, society, and collectivity.

> [I struggle with my own choices. Living and working at a university represents a move from a working-class background, and I choose research topics relevant to that heritage and contributions to peace and ecological health. I choose to travel to wilderness areas, align myself with ecosystems, and devote energy to silence, reflection, and ethical issues. I search for research projects and course topics related to protection of wilderness, peace, play, and cultural plurality. On the other hand, are these just rationalizations for someone who loves to travel, teach, read books, and write? What right do I have to consume the resources I do, enjoy the life I have when millions of people cannot even dream of my life?]

These thoughts circle back upon the existential questions related to individuals, society, collectivities, nature, and how one ought to live. Welch (1990) suggests that we respond to these questions ethically only through material interaction. She defines material interaction beyond dialogue to include working together toward survival, quality of life, and respectful, political engagement for all living beings and ecosystems. A sojourner, while moving into spaces on the edge, also constitutes herself within matrices and webs that enhance the capacity for reciprocal, intersubjective connections that sustain mutual critique and collaborative initiatives. We argue that sojourning helps to rethink the link between identity, movement, power, and wilderness. The metaphor of sojourning provides a new lens for understanding the limitless phenomena of wilderness. Sojourners should make the world uneasy for themselves and others, because they blur the boundaries and ask for reassessment of values and perspectives often left unexamined. Our description of sojourning is guided by Orlie's (1997, p. 166) work about the potential of an ethical and politically active self: "To be so sensitized an instrument, one upon whom everything leaves a mark, with whom everything sets up a correspondence, is not simply to be an observer of life's surface, but someone who must bring into evidence, even bring into being, moral substance." Paradoxically, the responsibility demands incalculability and unpredictability, while the freedom requires that sojourners be responsive to the harms that invariably accompany what good sojourners strive to do. In short, to live ethically we must think and act politically (Orlie 1997).

> [Wilderness areas can often have symbolic meaning to people who live near them and to people who actually visit them. The students in this trek were especially interested in climbing Mt. Kenya because the mountain and its immediate area of forest and wild land had been a major symbol of the Kenyan independence movement in the 1950's and 1960's. Mt. Kenya was the major stronghold of the rebel movement that actually won independence from Great Britain. The revolutionary fighters hid and operated out of this remote wilderness area, and the mountain became a major symbol of freedom and strength for many black Kenyans. As we moved up the mountain, the students told me of their relatives who had lived for years on the remote slopes of the mountain during the revolution. When we reached the top of the peak, the students pulled out a Kenyan flag they had carried to the top for that purpose. They flew the flag from an ice ax and had their pictures taken as a group on the peak. They were the only black Kenyans on the peak that day, and some of the very few who actually climbed to the top. The symbolic meaning they gave to the mountain, and to their community climb to the top, was a fitting metaphor for the struggles against exploitation they and their culture have had to deal with for generations. It was an "ethics learning

experience" that this sojourner could only have had with that group in that place.]

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Personal and Social Meanings of Wilderness: Constructing and Contesting Places in a Global Village

Daniel R. Williams

Abstract—This paper takes a social constructionist approach to examine the nature and dynamics of personal and social meanings of wilderness. The paper builds on geographic and social theory to discuss the ways in which conflicts over the meaning and value of wilderness are significant consequences of modernization and globalization. The process of modernization destabilizes and "thins-out" the meanings assigned to places and undermines older, more traditional meanings. While such social constructionist views of wilderness and nature are sometimes seen as undermining protectionist claims, this paper argues that understanding the way that meaning is socially negotiated and contested is necessary for effective allocation and management of wilderness.

A major theme to come out of the 5th World Wilderness Conference held in Tromsø, Norway, in 1993, was the important role social and cultural values play in shaping conceptions of nature and wilderness. One very successful session at the Tromsø conference, for example, explored "The Idea of the Wild." In that session, philosophers and historians examined the meaning of wilderness and wild in a historical and cultural context. In many ways the discussion generated by that session was emblematic of the whole conference. At the very least it precipitated deeper reflections among wilderness researchers regarding nature and the value of wilderness to society.

While this theme was examined primarily by historians and philosophers, the international nature of the delegation also bolstered a greater recognition on the part of United States wilderness researchers of the importance of culture in giving meaning to wilderness. Since the Tromsø conference there has been much more transnational discussion and interaction about wilderness. Thus, the inclusion of three sessions on the personal and social meanings of wilderness at the Sixth World Wilderness Congress in Bangalore is an effort to follow up on this theme. In particular, these sessions were organized to look at how the social or cultural construction of wilderness and nature impacts the management and administration of wilderness and other protected areas. In a sense, we need to pick up the gauntlet thrown down by the philosophers and historians and examine what some of their ideas mean for allocation, use, and management of wilderness—that is, to look at the implications of this philosophical and historical "rethinking" of nature and wilderness.

One consequence of this challenge has been to force American wilderness researchers and managers to step outside the wilderness and look at public values and personal meanings independent (but not exclusive) of recreational use and visitation. This perspective is already evident in the examination of new (or at least relatively ignored) questions for management. Examples that come to mind are questions of indigenous uses (collecting native materials), introduction and control of exotic species, reintroduction of native species, fire ecology and suppression, and so forth.

It also causes us to rethink the meaning and role of recreational use of wilderness within the context of modern society. For Americans, wilderness visitation has played a critical role as a ritual celebration of cultural heritage. Preservation of wilderness is, in part, advanced by passing on the meanings and values through these rituals. Without use and visitation, wilderness is reduced to an abstract "unlived" experience or idea. From this broader perspective, the focus on recreation use turns to how it functions to "reproduce" cultural concepts of nature and wild.

Another theme is to examine specific wildernesses as concrete places that individuals and groups have come to value, rather than as representative of some cultural category of place. In this context we might pose the question: What contribution does wilderness or protected area designation make to local sense of place or identity.

The Social Construction of Wilderness

Natural landscapes have always carried important and varied emotional, cultural, and symbolic meanings. The very idea of "landscape" refers to the symbolic environment constructed by human acts of assigning meaning to nature, space, or environment (Greider and Garkovich 1994). Throughout history, natural landscapes have represented places to live and extract a living; places to play and appreciate; places to define self, community, and nation; and places within which to contemplate one's spiritual and biological status in the world.

A constructionist approach—anchored in the sociology of knowledge, interpretive sociology, and much of what now passes as postmodern epistemology (Burr 1995)—addresses

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the historical, cultural, and political processes by which humans seek out, create, evaluate, and contest specific place meanings. Within the context of nature and wilderness, social construction refers to social, cultural, and political processes by which groups of people create shared meanings and understandings of a place and how these shared meanings, in turn, structure social actions in, and with respect to, those places (Menning and Field 1997). The designation of wilderness landscapes in America is a case in point. The wilderness designation debate was subject to lengthy social and political negotiations that eventually resulted in a formal legal definition. This legal definition, complete with use and management prescriptions, now shapes the way these landscapes are used, experienced, and ultimately modified.

As part of a larger project of postmodern social critique, a social constructionist view of wilderness is sometimes seen as an intellectual attack on the concept of nature itself (Soulé 1995). Just looking at the titles of some recent books suggests as much. Nature has been "refashioned," has come to an untimely "end," or has simply "died." Opponents fear that if concepts such as nature, wilderness, and endangered species are regarded as socially constructed, their meanings are subject to varying and contestable interpretations. As Cronon (1996) notes, because the meaning and value of wilderness would seem "up for grabs," arguments supporting a social constructionist view of nature have the appearance of giving aid and comfort to those who would ravage nature. But to assert that "nature" is natural and therefore, its value beyond question, obscures us from recognizing that ideas, interpretations, and meanings have real consequences.

To this point, the constructionist or "sociocultural" perspective has been largely neglected in the United States as a basis for understanding wilderness use and meaning in favor of a goal-directed view (Williams and Patterson 1996). The goal-directed or opportunity approach employs a utilitarian language that enables wilderness meanings and values of the landscape to be defined and managed in ways analogous to other, competing land uses (such as, timber, water, grazing). Thus, much like consumer goods, wilderness is often described as collections of features or attributes that recreationists value, prefer, or seek.

Though wilderness research has clearly profited from this view in terms of site management, its limitations are increasingly recognized. What I have elsewhere criticized as the "commodity view" of outdoor recreation (Williams and others 1992), presumes that recreation places are theoretically interchangeable or substitutable, minimizes the role of socioeconomic and sociocultural (for example, class, gender, and race) forces for influencing opportunity structures and individual goal orientations, reduces environmental meanings to behavioral utilities, and generally ignores the symbolic environment and the social processes that create and contest environmental meanings.

The notion that landscapes, including wilderness, are socially produced suggests instead that their meaning is anchored in history and culture and not simply the objective, inherent, enduring, tangible, and visible properties of objects in nature. The point is not to deny the existence of a hard reality "out there," but to recognize that the meaning of that reality is continuously created and re-created through social interactions and practices.

It is impossible to talk about the meaning and value of wilderness without acknowledging to some degree the role of culture in giving meaning to things. For example, the frontier and pioneer history of the United States is critical for understanding the meaning and management of public forests, wilderness, and national parks. Early American settlers constructed a pristine landscape empty of civilization. They settled a vast, "unoccupied" continent that, from Anglo-European eyes, was initially seen as devoid of meaning apart from the instrumental uses that could be extracted from it. The specific meaning of any particular place was, in effect, very thin to start with. Landscapes were seen as mere "resources" that lacked any historical or cultural significance until Europeans occupied it. Slowly, the American landscape has taken on more and more cultural and symbolic meanings. Wilderness and the frontier began to symbolically represent American civilization (and the civilizing of the American landscape). Recreational use of wilderness and nature became a ritual for reproducing the frontier experience and what was taken to be the American character.

In addition to spawning certain recreational practices, I suspect this slow thickening of meaning has given rise to certain tendencies in how Americans relate to and manage the landscape. Given their relatively short history of occupation of the landscape, Euro-Americans have some difficulty legitimating emotional, symbolic, or sacred meanings, meanings that by their very nature tend to be rooted in the past. Because Americans encountered a landscape lacking the marks of their own history and culture, they were not burdened to uphold historical meaning and practice. They were relatively free to build a "rational" (a historical) foundation for landscape meaning and valuation. Thus, the history of public resource management was initially a laissez faire process of allocating land to limitless possible uses, a process of disposal of the public land to private, utilitarian uses. For those remaining lands, that were not transferred to private ownership, Americans developed highly bureaucratic and rational processes of allocating specific uses to specific tracts of land. Lacking deeper historical and cultural meanings, they were free to employ criteria of utilitarian efficiency to guide land-use allocations.

Only after extensive settlement of the land, with more and more of the land cultivated and civilized, could Americans imagine a symbolic value to "preserving" as opposed to "using" the land. As they began to associate the frontier with the American character and experience, portions of the land began to take on symbolic value as wilderness. Only as Americans created history could they sanctify places in the American landscape, and even then they often sought a more utilitarian reason for such actions.

In other cultural contexts, I presume it is more difficult to think in terms of unoccupied, unsettled, and uncivilized landscapes (this was very much the point of many critics of the wilderness idea in Tromsø). On the one hand, the deeper history and thicker meanings are more easily threatened by growing demands and changing uses of the landscape. As meaning deepens with time and occupation of a landscape, more complex and conflicting uses and meanings must be coordinated on the land. On the other hand, a shared sense of history and culture may give people a stronger sense of what is appropriate in a given landscape. These may be

institutionalized, not as bureaucratic regulatory processes, but in the form of law, custom, and traditional practices—as a shared sense of place.

The Meanings of Wilderness: Personal, Social, and Ecological

To understand the meanings of wilderness is to understand the way in which socially constructed landscapes define and symbolize who we are. As Greider and Garkovich (1994, p. 2) put it: "Our understanding of nature and of human relationships with the environment are really cultural expressions used to define who 'we' were, who 'we' are, and who 'we' hope to be at this place and in this space." In what ways, then, do wilderness landscapes create and recreate identity?

Some 10 years ago, I along with some colleagues were asked to review the "human development benefits of wilderness" (Williams and others 1989). Drawing on the social psychological theories of self-affirmation, we argued that through leisure people actively seek out and create opportunities for self definition. Wilderness can provide individuals with a sense of who they are through their use as symbols. The self-affirmation process can be thought of as composed of three facets: an affective dimension (an evaluative dimension we generally think of as self-esteem); a virtually infinite number of cognitive dimensions or self-images (a set of beliefs about ourselves, including who we are, our likes and dislikes, and our goals and aspirations); and a motivational dimension that actively searches for and creates opportunities for self-definition (as we develop as individuals, we strive to understand ourselves and be more clearly understood by others). This motivational facet is particularly significant because it makes human development less of a reaction to one's social and physical environment and more of an active "transaction" with it.

Self-affirmation emphasizes that we often act to "cultivate" a desired identity, as opposed to having our social and physical environments impose a given identity upon us. This is especially true in leisure, where we presumably exercise some level of choice of how we want to express ourselves. People tend to avoid situations that provide unwelcome self-definitions, and seek out and actively create situations that provide the supportive feedback they desire. The term self-affirmation implies seeking clarification of who we are when we are uncertain of our identity, the values we stand for, and so forth.

What role does wilderness play in this self-affirmation process? We suggested that wilderness contributes to identity at three levels.

1. Individual identities may be tied to wilderness and specific natural landscapes, such that the use of these places (through actual visitation or in vicarious and symbolic ways) affirms important beliefs about the "personal self" or who we are as individuals. We may exhibit certain behaviors related to a landscape that give us feedback that we are, for example, adventurous, self-reliant, independent, well-traveled, or physically fit. Particularly in Western individualistic societies, nature contact offers "individuation"—a free space where one can forge and affirm one's uniqueness as an individual and achieve one's own pattern of satisfaction.

2. Natural environments can give us feedback as to our "collective self" or cultural identity. Wilderness for Americans is an important symbol of our shared heritage. Historically, according to Nash (1982), national parks and wilderness (and the vast public land estate more generally) have served to give Americans a cultural identity, especially when we felt inferior to our European cousins who presumably had a richer cultural heritage. As Nash (1969, p. 70) observed, "Our national ego is fed by both preserving and conquering wilderness."

How natural places are "constructed" and managed and the ritual exhibition of recreational practices became national character traits. Again, Nash (1982) writes of the wilderness cult (Teddy Roosevelt's Boone and Crockett Club, the Appalachian Mountain Club, and the Boy Scout movement) at the beginning of the 20th century to argue that with the closing of the frontier America was prompted to seek ways of retaining the influence of the frontier's (manly) virtues of energy, resolution, and self-reliance on modern society.

Nature plays a prominent role in defining national identities in other countries as well. In work that I have been doing in Scandinavia, contact with nature appears to be a strong ideological theme in cultural or national identities, just as the conquest and preservation of wilderness is an American ideology (Williams and Kaltenborn 1999).

3. At a more philosophical level, nature contact may also provide a kind of identity feedback that is important to humans as a species. That is, nature contact validates our sense of "biological self" or ecological place in the world. It affords humans an opportunity to discover or affirm who they are as one race or species among the many species in the world. It affirms our earthy origins. As Rolston (1986, p. 104) states: "Humans are relics of… [the natural] world, and that world, as a tangible world in our midst, contributes to our sense of duration, antiquity and identity." While empirical evidence suggests that we humans are capable of living life in a world largely devoid of nature contact (such as, in dense urban environments), without some level of access to nature, we lose a part of ourselves.

The role of wilderness preservation and use in affirming an individual self identity—the process of individuation or establishing individual personality—is generally recognized in the psychological literature on wilderness benefits. What is perhaps less widely understood is the role of wilderness pursuits in cultural identity and national ideology. In the American context we have left this topic largely to historians such as Nash, preferring to concentrate on issues having presumably a more direct bearing on day-to-day nature management.

Similarly, the idea that wilderness serves as a symbol of shared biological or ecological identity (reminding us of our ecological relationship to the earth) has mostly been a philosophical discussion about environmental ethics. This gets debated in terms of ideas such as bioregionalism and ecophilosophy that seek to "rediscover" our lost sense of home and place in nature. The importance for management of wilderness has to do with how we justify the allocation of

lands for preservation of wilderness. If the goal is to advance the cause of wilderness, there is a danger in relying too much on recreational use (the individual identity) as the meaning and basis for wilderness protections. This narrows the value of wilderness to individual, instrumental purposes, suggesting that these values can be potentially achieved in other contexts and does not build on any shared or collective sense of value.

The Meaning of Wilderness in a Global Village

I have described the social construction of wilderness, place, and landscape, and attempted to connect these to the personal, social, and ecological meanings of wilderness. I want to now turn to the question of how modern social processes (globalization) impact the meanings of wilderness and what this suggests for wilderness research, management, and allocation. Globalization is problematic for wilderness. It not only makes it possible to rapidly transform physical space, but also the meanings society attaches to places. Globalization tends to thin-out and destabilize place meanings (Sack 1992) and aggravates conflicts over how places or natural landscapes should be developed and managed (Williams and Matheny 1994).

In a premodern era, local conditions were more predominant as constraints on how people adapted to and fashioned their world. Exploiting nature was limited by local knowledge, and the quantity and quality of locally available natural resources constrained economic and social activities. This tended to produce isolated local cultures with social patterns necessarily fitted to the contingencies of that place. This doesn't mean that humans were benign by modern ecological standards as Soulé (1995) reminds us. Rather the scope and scale of human-environment interactions were more directly embodied in a place. In other words, societies were adapted to the opportunities and constraints of local place.

In the modern era, as Harvey (1989) argues, the cultural invention of capital accumulation freed production activities from the constraints of local place and began a process of transforming places around the logic of market economics. Modernization (whether in the form of industrial markets, mass communications, or more efficient transportation) has in an important sense "freed" ourselves from constraints of place, or in economic terms, allowed for more efficient use of resources. This has had profound implications for both nature and society. Nature was, in a sense, demystified and disenchanted (Taylor 1992). Whatever inherent moral value nature may have possessed, it was supplanted by a view of nature as an instrumental resource to be exploited.

Similarly, individuals were liberated from local ways of life, community mores, and parochial society. Social theorists recognize that modernity—as the unmooring of social relations, production and consumption, and even our identity from particular places—also leads to greater freedom to contest the meanings we ascribe to both our immediate and more distant surroundings. Just as material life is no longer bound by local ecological limits, modern social norms and practices have become increasingly the province of the sovereign consumer or voter. While much has been gained in terms of material well-being and individual autonomy and liberty, modern social relations have also led to the displacement of local, community norms and standards of behavior by individual preferences as expressed in the marketplace or the voting booth (Wolfe 1989). The meaning of a place (wilderness) is increasingly subject to a kind of ideological marketplace with all of the competition and instability that goes with it.

Modernity has restructured time-space relations by making possible rapidly accelerating rates of exchange, movement, and communication across space—what Harvey refers to as "time-space compression," or what Marx once described as "the annihilation of space by time." Globalization is an important geographic outcome of modernity that contributes directly to the unmooring of social meanings and norms. But as Sack (1992, 1997) argues, the condition of modernity is not so much about a decline or loss of place-based meaning, as it is often interpreted, but about a change in how meaning is created or constituted in the modern age. He suggests that the processes of modernization, globalization, and time-space compression have the effect of thinning the meaning of places. "From the fewer, more local, and thicker places of premodern society, we now live among the innumerable interconnected thinner places and even empty ones" (Sack 1997, p. 9). Modernity partitions space into smaller and finer units and assigns specialized meaning to each. Under these conditions there is "virtually a place for everything and everything is supposed to be in its place" (Sack 1997, p. 8). With modernization and globalization, meaning is increasingly created in a spatially decontextualized world of mass consumption and mass communication, a world in which market forces continuously rework the meaning of places.

In places where contact with nature has been central to national and cultural identity, any change, loss, or thinning of traditional meanings and values associated with natural landscapes is likely to be especially troubling. For example, in Scandinavia there is considerable evidence that people feel their distinctive outdoor traditions are increasingly threatened by rapid urbanization, see their cultural identity as potentially threatened by the European unification, and express concern that the growing use of natural landscapes as nature-tourism destinations by the rest of Europe will interfere with these traditions (Kaltenborn and others 1995). As Eriksen (1997) argues, through their power to ritualize the cultural memories of rural Scandinavian life, these traditions provide a way to shelter one's identity from changes associated with an increasingly multi-ethnic, urbanized, and globalized culture. However, globalization also appears to be pressing in on these traditions of nature contact and "thinning" them as they become the commodified interest of increasingly spatially and culturally distant social groups.

The questions remain:

- Is wilderness a way to reconnect modern identities to nature, place, and community?
- Can nature facilitate maintenance of ancestral ways of life in a global world?
- Is wilderness just one more piece of ground to become segmented by modernity and thereby diluted of traditional meanings?

Implications

The social constructionist perspective on social theory suggests that society has more or less always functioned by working through contested meanings of places, things, resources, and ideas. However, the disequilibrium that is so much a part of modernity and globalization propel this process of contesting place meanings to new levels of intensity and geographic scope. Given our collective power to make and remake places, not even wilderness can escape from being a socially constructed space.

Still, the social construction of meaning is not completely amorphous. The creation and contestation of meaning involves social interactions structured within and by interest group formation and action, regulatory agencies, administrative procedures, law, local government, planning processes, and so forth. These processes are most obvious in the formal political arena, but they also occur through everyday practices such as deciding where to vacation or retire; whether and where to build a new shopping mall or Wal-Mart; and a thousand other small decisions made by consumers, businesses, families, and government officials.

The point is that focusing on a sociocultural view of meaning (whether personal, social, or ecological) causes us to examine not just what values people hold, but where these values and meanings come from, how they vary from place to place and community to community, how they are negotiated in society, how they are used in conflict situations, how they are impacted by modernization, and how they influence policy decisions. By focusing on how values and meanings are socially created and contested and how these affect the management system, we begin to develop models of the social system that recognize historical context, reflexivity, and disequilibrium, and we begin to develop procedures to address inevitable social conflicts and differences. By focusing on history and scale, social knowledge is made more compatible with ecosystem models.

Culture can be thought of as a map of meanings through which the world is made intelligible. However, culture is not entirely consensual or shared, as it has often been described, but is something that varies across individuals and groups, and is contestable by various interests (Hansis 1996). Wilderness designation, management, and use take on different meanings for different people and, in the process of negotiation, new meanings and group identities are created and modified. Cultural meanings are also made concrete through patterns of human action. Thus, planning, as a strategic human action, is a kind of meaning-making. Planning creates meaning rather than merely representing meanings "as they really are." Exercises in mapping meanings are, by definition then, necessarily political acts in which meanings are being created and contested, with certain meanings gained and lost in the process. This view recognizes power relations. It asks: Who gets to draw the map? It focuses on how meanings and values are produced and reproduced through actual social practices that take place in historically contingent and geographically specific contexts.

Regardless of how one feels about the "cultural politics" that globalization engenders and intensifies (and the corresponding reduction in the power and authority of science and expertise), such politics are part of the social reality. It is perhaps tempting to think that meaning should be defined by an elite of scientists and well-informed activists. We would like to discover some "rational" foundation for ecosystem health that transcends local cultural truths. But within the context of society in a hyper-modern age, such a foundation (or at least widespread agreement as to what it is or should be) does not exist. We have a social reality of contested meaning and practice. How experts, planners, or resource managers map natural and social systems is, in fact, highly contested. To not recognize and theorize about this aspect of social systems is to push away some part of social (political) reality. It is failure to integrate an important human dimension of ecosystems into ecosystem models (the human dimension of culture and politics). Scientists and other humans are political animals that create and negotiate social reality. As wilderness and ecosystem managers, we cannot set aside that political reality, as some seem to suggest, as if it were outside the wilderness or ecosystems we seek to understand.

The mere examination of topics such as landscape meanings, social identities, and cultural differences reflects a uniquely modern concern: these things are made problematic by globalization. Identity and sense of place become most valuable to people when these things appear to be threatened from the outside. From the theoretical perspective of social constructionism, a major impact of modernity and globalization is to destabilize and thin out the meaning of places. It further suggests that places contain multiple and conflicting histories and that people affirm multiple and conflicting identities. All histories, boundaries, and categories become negotiable. Experts are dethroned.

As unsettling as all this is, what we are seeing more clearly as a result of modernity is that most of what we thought was inherent and enduring was really socially constructed all along. The accelerated pace of change (time-space compression) just makes us more aware of the extent and manner that the world has always been socially constructed. Quite simply, the taken-for-granted can no longer be taken for granted.

Finally, as an applied researcher, I believe there is practical value to understanding how places are socially constructed and contested. Much of what I see as the current challenge for natural resource management grows out of the increasingly contested meanings of places and ecosystems that come with modernity and globalization. Understanding the processes of making and contesting wilderness meanings gets at the heart of natural resource conflict, not just in regard to wilderness and recreational uses, but other contested land uses as well (such as, timber, grazing, mining).

Moreover, the social constructionist perspective draws attention to the idea that the work of environmental scientists, managers, and planners is itself an effort that seeks, creates, contests, and most importantly, negotiates the meaning of environmental features. As planners, this means moving away from top-down, data and expert-driven management styles and toward more deliberative, discursive, collaborative styles. Stated more globally, we need to learn how to collectively negotiate through change and across differences. This is much easier said than done, of course, as societies have structured all manner of processes and institutions around single histories, defined boundaries, fixed categories, and reified meanings.

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Mountaineering: The Heroic Expression of Our Age

Mikel Vause

Abstract—The thesis of this paper focuses on Walter Bonatti's philosophy on the role of mountaineering as a means of experiencing wilderness in a modern techno/industrial society. Problems of going into wilderness settings with too much baggage are discussed. One example is that of the climbing disasters on Mount Everest in 1996. Several years before the actual accidents, Sir Edmund Hillary, a partner in the first ascent with Tenzing Norgay, in 1953, expressed concern that people using the mountain as a business were "engendering disrespect for the mountain." Bonatti's point is that mountains are places to escape the commercialism of a collective, industrial society. This thesis is supported with arguments by notable thinkers and wilderness philosophers such as William Wordsworth, Edgar Allan Poe, John Muir, Doug Scott, Woodrow Wilson Sayre, Geoffrey Winthrop Young, Chris Bonington, and Phil Bartlett.

Wildness is something of great import in a world of rapid, and in many cases poorly planned and unchecked, techno/industrial growth. We must hold on to it, not for ecological reasons alone, but we must recognize it for what it is: our spiritual home. In the words of John Muir: "Going to the mountains is going home...."

> However mechanized, or automatized, the conditions of human life may become, the same number of human beings will, I believe, continue to carry this inherited memory, reinforced for action by the new awareness of mountains and of mountaineering which has come with this last century (Young 1957).

The End in Itself

In the past few years, with the influx of climbing parties in all of the major mountain ranges, and the number of accidents (many ending in death), the question of why humans climb has come to the forefront. For what purpose do people go into high, cold, and extremely dangerous places? It is obvious that income from such enterprises is minimal. Aside from airlines, only a few expedition outfitters are making a profit from supplying equipment, food, guides, etc. The native economies, such as in Nepal, receive certain benefits, and occasionally a climber might sell a book or film. In reality, the commercial aspects of climbing mountains are limited.

For most mountaineers, the pure physical enjoyment and spiritual uplift that accompanies a body tired from adventure in wild nature is reason enough to climb mountains. Materialism is, for most, at the bottom of the list. As John Henry Newman argues, "knowledge [has] its end in itself," so, also, climbing mountains has "its end in itself." One ventures out for the riches of building both a strong body and mind, and in some cases, to become rich in the spiritual sense. This argument could be fairly made until recently, but in the past decade or so there has developed an ever growing sense of commercialism in the world of mountaineering.

The guiding business is nothing new to mountaineering. In fact, climbing may never have evolved as it has were it not for the early shepherds and hunters leading European aristocracy through the Alps, Scottish Highlands, and England's Lake District. Climbing schools, such as: The International Alpine School in Switzerland, Exum Guides in the Tetons, National Outdoor Leadership Schools, and Outward Bound, have continued is this sport-old tradition of mountaineering. One need only to look in the advertisement pages of outdoor and climbing magazines to find dozens of schools and services that offer the climbing experience. The fact that there are places people can go to get instruction on how to become mountaineers is a good thing, which was the overarching philosophy of guide services and instructional companies. Such companies, for the most part, continue to be useful when they focus on teaching mountaineering.

But sadly, as with about every other aspect of our society, individuals start looking for ways to profit by providing shortcuts, or ways to achieve desired ends by cutting corners. The television is replacing books, and the telephone is replacing written correspondence. Why read a novel when one can watch a film based on a novel, or write a letter when, in a matter of seconds, space and distance can be spanned with a phone call or email? There is very little in our world that technology has not affected. This, coupled with the immediacy modern society attaches to all aspects of life, paradoxically makes much of what we do, in the end, more complicated.

Technology Versus Experience

Climbing is no different. As Coburn (1997, p. 53) in "Everest: Mountain without Mercy" points out, because of air support the trip from Kathmandu to Lukla that was once "a two week walk [has]...been reduced to a forty minute flight." Air support now allows relatively easy access to high, remote mountains, and this is not the only high-tech advantage. One must also consider the advances in equipment such as plastic boots, step-in crampons, high-tech ice axes, ever-dry ropes made from stronger and lighter nylon, clothing that weighs nearly nothing and is not only waterproof

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but breathable, light-weight stoves, and freeze-dried food; the list goes on and on. Yet with these many improvements intended to make the activity more safe, and certainly more comfortable, why are people climbing big mountains and dying at such alarming rates?

Part of the problem has to do with why they are on the mountain in the first place. Are they there for intrinsic reasons, for example, personal physical challenge, or mental and spiritual elevation? Or are they climbing because high adventure is in vogue and they have some disposable income? It is commonly held that one can do anything with money. When it comes to climbing, many believe that because they can hire an experienced guide and are able to purchase the latest Goretex clothing and the most up to date climbing hardware, they will be safe. By taking on the role of client, they have purchased protection without paying the "real" dues that come from personal experience. According to Peter Athans, a professional Everest guide: "Occasionally you'll get a client who thinks he's bought a guaranteed ticket to the summit" (Krakauer 1997, p. 23). The truth is that no amount of expensive equipment, or the fact that one is part of a guided party, can substitute for experience. In order to perform in difficult situations one must be prepared, and preparation comes from experience.

Apprenticeship

In the climbing community in which I grew up, there was a core group of climbers who served as mentors to almost all the beginning climbers in the area. It was nearly impossible to start a climbing career without having some contact with members of that group. It was a friendly time, and new climbers were welcomed as long as they wanted to learn proper climbing techniques. One served an informal apprenticeship by climbing with more experienced climbers. After one had learned rope handling, proper belaying techniques, and how all the equipment worked on short top roped climbs, the new climber was ready to serve as a second and participate in multi-pitch climbs. (Admittedly it wasn't all that hard to figure out how to drive and remove pitons; today's equipment is a bit more technical and takes more practice to use.) After a period of participation as a second, the opportunity to lead came. By today's standards this process seems long and drawn out, but looking back I remember very few accidents, and a fatality was extremely rare. Part of the problem today is impatience.

Immediate Gratification

We live in a world that has come to expect immediate gratification on all fronts. Everything one wants in life must be immediately available. In the 1990's it is almost unheard of for a young person to save money to buy a car. Why should one have to wait when they can simply take out a loan. One can hardly walk across a college campus in America without being confronted by numerous opportunities to apply for credit cards. This have-it-now philosophy easily transfers to all other aspects of society. There can be no question that in many ways the amazing technological advances of the twentieth century have made life better, but in some ways it has made life more dangerous because it provides opportunities too easily and without requiring proper preparations. The disasters on Everest in 1996 drives this point home.

In an attempt to "unite vocation and avocation," climbing guides like Rob Hall, Scott Fischer, and others somewhat unwittingly diminished the dangers of climbing a mountain the size and immensity of Everest. In an attempt to make a living doing what they loved to do they allowed people who had no business being on Everest, due to lack of experience and preparation, who hadn't paid their dues so to speak, to not only endanger themselves, but put the lives of other climbers on the mountain, the guides in particular, in jeopardy. According to Sir Edmund Hillary, the first to successfully reach the Everest summit in 1953, ventures such as Hall's and Fischer's are "engendering disrespect for the mountain" (Krakauer 1997, p. 66). Krakauer provides a vivid illustration as he recounts a conversation with Scott Fisher:

> A few weeks after Fischer returned victorious from Everest in 1994, I encountered him in Seattle. I didn't know him well, but we had some friends in common and often ran into each other at the crags or at climbers' parties. On this occasion he buttonholed me to talk about the guided Everest expedition he was planning: I should come along, he cajoled, and write an article about the climb for "Outside" (magazine). When I replied that it would be crazy for someone with my limited high-altitude experience to attempt Everest, he said, "Hey, experience is overrated. It's not the altitude that's important, it's your attitude, bro. You'll do fine. You've done some pretty slick climbs—stuff harder than Everest. We've got the big E figured out, we've got it totally wired. These days, I'm telling you, we've built a yellow brick road to the summit" (Krakauer 1997, p. 66).

Such statements as those attributed to Scott Fischer are not only deceptive but extremely dangerous. As all mountaineers know, the complexion of a mountain can change from moment to moment. In a recent conversation with Doug Scott, who reached the summit of Everest via the Southwest Face in 1976, the point was made that if one signs onto a guided expedition to Everest they should be sure they have purchased a round-trip ticket. "...We've built a yellow brick road to the summit," but what about getting down from the summit alive? Apparently there were some in 1996 who, unfortunately, only had a one-way ticket.

This essay is not meant to be an attack on Rob Hall, Scott Fisher, or any other mountain guide, but it does raise questions about the "materialistic premises" creeping into mountaineering, which is the concern Bonatti (1974) addresses in his essay, "Mountaineering."

In Bonatti's essay one finds one of the best examinations of why humans climb mountains. The essay "Mountaineering" provides a careful examination of the role of the mountaineer in the modern era, dominated by technology and industry. Because mountaineering is basically a romantic (intrinsic) pursuit, it seems to be at odds with the basic philosophies that govern a (extrinsic) techno-industrial society where material gain equates with success. The article deals with the age old, archetypical conflict between the spiritual and the physical. Many mountaineers find that time spent in the mountains brings them to elevated inner feelings, sometime revelatory, sometimes insightful or reflective, as the result of direct contact with wild nature, or nature in a relatively unmolested state—free from the harmful by-products of human over-involvement.

Philosophical Considerations

It is clear in romantic philosophy (whether it be the ancient eastern philosophers of Buddhism, Taoism, or Hinduism, or the more modern western philosophers such as the German romantics Goethe and Schiller, the English romantics Blake, Wordsworth, and Coleridge, or the Americans Emerson, Thoreau, and Whitman) that humans, if left to the influences of the unspoiled natural world, will in fact, elevate themselves to an almost divine state through repeated contact with the workings of the natural world.

Humans learn best by first-hand experience. In the words of Ann Zwinger, "there is no substitute for blisters and sunburn" (Trimble 1989, p. 9). Bonatti's philosophy agrees with that of Zwinger as he explains that to venture into the mountains is a natural human desire. He, in fact, argues that testing oneself against the mountain is "a way of expressing man's ancestral dialogue of love with mother nature in terms of action" (Bonatti 1974, p. 71). Bonatti, the romantic, goes on to lament the loss of past values, particularly those placed on mystery and heros. He says, "Daily living has become a round of demands, provocations, and doubts. The intellect sweeps away spiritual values even before they are formed. Deprived of standards in a decadent society where nothing is fixed or defined, heroism has leaked away for sheer lack of purpose."

Edgar Allan Poe (1966) expresses the same concern in the poem "Sonnet To Science:"

> Science! True daughter of Old Time thou art!
> Who alterest all things with thy peering eyes.
> Why preyest thou thus upon the poet's heart,
> Vulture, whose wings are dull realities?
> How should he love thee? Or how deem thee wise,
> Who would not leave him in his wandering
> To seek for treasure in the jeweled skies,
> Albeit he soared with undaunted wing?
> Hast thou not dragged Diana from her car?
> And driven the Hamadryad from the wood
> To seek a shelter in some happier star?
> Hast thou not torn the Naiad from her flood,
> The Elfin from the green grass, and from me
> The summer dream beneath the tamarind tree?

Bonatti sees the mountaineer as taking up the role of hero in a time when the human spirit needs a new champion who, through physical action and spiritual elevation, leads a rebellion against "the frustrations of industrial civilization, rebellion against a collective society, a society almost happy to sink into a general mediocrity, and always content to seem rather than be. It is also a rebuttal of disillusion and ignobility and of that security offered as progress, which, when achieved, makes spiritual progress impossible" (Bonatti 1974, p. 72).

To the romantics, a techno-society is evil as it entices people, through the glorification of the material, to divorce themselves from nature. There is an obvious danger in the invitation of industry for people to leave the pastoral settings such as small villages and farms, where they are in constant contact with harmonious workings of nature, for the large industrial urban centers made up of row houses and factories. In the pastoral setting, currency is much less important than in urban settings because much of what is necessary for existence is produced through an active partnership with nature—tilling the land, planting seed, tending the garden, and reaping the harvest. Whereas, in the urban setting of the industrial community, one receives wages for working in the factories; it is necessary to purchase life's necessities from vendors, thus eliminating first-hand participation in the harmonious natural process. As Wordsworth (1990, lines 179-200) states in his poem, "The Old Cumberland Beggar:"

> May never HOUSE, misnamed INDUSTRY,
> Make him captive!—for that pent up din,
> Those life-consuming sounds that clog the air,
> Be his natural silence of old age!
> Let him be free of mountains solitudes;
> And have around him, whether heard or not,
> The pleasant melody of woodland birds...
> As in the eye of Nature he has lived,
> So in the eye of Nature let him die!

Emerson suspects that humans are the only animals not in harmony with the natural world and that human disharmony is learned, not innate. Such a philosophy is in direct conflict with the old puritan standards of Emerson's time that argued humans are born degenerate as a result of the fall of Adam. Emerson sees in most humans an innate goodness that gets replaced with learned disharmony, and they are, therefore, further removed from the natural world and its spiritual by-products. Emerson goes on to argue that humans can, in fact, but only through frequent contact with wild nature, actually unite what he called the "ideal and the actual," and thus bring together the physical and spiritual to create a harmonious existence.

This same idea is paramount in Scott's (1991) essay, titled "On the Profundity Trail," in which he argues that going into remote places (places that take commitment to visit) enables him to recharge his spiritual batteries, and when he returns to the social world he is better prepared to contribute to its betterment. In recounting his ascent of the Salathe Wall, Scott states: "...after the trip I did seem to know positively where to go next—and that was back into society, relaxed, but with a new zest and enthusiasm...." He goes on to explain that the more commitment it takes to complete the journey the greater the reward:

> If big wall climbing is pursued in a more hostile environment and for longer periods, if the big wall climber climbs alone, as Bonatti did on the Dru, then the doors of perception will be opened wide. The climber involved may experience a more lasting state of heightened awareness, and may even reach a truly visionary, if not mystical, state of being which transcends normal human comprehension.... The climber who is willing to extend himself to the limit of his technical skill and endurance on any long climb, is en route up the profundity trail (Vause 1993, p. 110).

Who Should Be on Everest and Why

Returning to the idea of novice climbers on Mount Everest, it should be noted that even though both Bonatti and Scott speak of committing oneself to the "limits of technical skill and endurance," the point should also be made that one must

know, and be realistic, about one's limitations. Spiritual and intellectual enlightenment does little good if one is dead and unable to share it with others.

So why climb? The argument has been made that to do so for material reasons can, in many cases, only lead to disaster as was the case on Everest in 1996. Ironically, it was those with the most experience that were killed in an effort to meet their obligations to paying clients. Wilford Noyce, a member of the successful 1953 British Everest Expedition said, "...we go out because it is our nature to go out" (Vause 1993, p. 10). Anderson (1970), in his work, "The Ulysses Factor," states it is a natural human instinct to explore—to seek adventure.

The philosopher Sayre (1964) led a four-man expedition to the north side of Mount Everest in 1962 and recorded the adventure in the book "Four Against Everest." In this most interesting expedition account, he discusses several reasons humans climb: "the question about climbing is not a question about motivation at all....it is really a question about relative values." One value is that of beauty: "If a person will cross the ocean just to look at the beauty of a cathedral, why would he not do as much or more to see sights such as these [speaking of the Himalayas]" (Sayre 1964, p. 204). Sayre goes on to say that there is a reason greater than to view beauty, but it is directly connected to beauty:

> Very closely assisted with the beauty of the mountains are some special emotions which the highest and wildest peaks provoke. I feel a special excitement when I look out over thousands of square miles of untouched country. I feel it again when I walk where only a handful of men have walked in the history of the world, when I explore some hidden ridge or crag, or when I make the first track across a great unbroken snow field. I feel a special happiness to be alone in the high, silent places of the world tucked close under the sky. Such things are worth a little insecurity and sacrifice (Sayre 1964, p. 204).

Just as Bonatti and Scott, Sayre loves his time in wild solitude, but he also recognizes the need for contact with others of his kind:

> We need to experience nature with friendly marks upon it of human works and struggle and hope. But also we need to see nature apart from even the smallest sign of human interference. For this the high mountains are perfect (Sayre 1964, p. 208).

Bartlett, a mountaineer and author of "The Undiscovered Country," sees the need for humans to return to their primitive roots and that going into the mountains is a means to that end. He points out, "A return to the primitive encourages a mental retrenchment in which the forgotten elements of life regain their rightful status....the attraction of the primitive life is that it takes one away from these pressures [Bonatti's industrial, collective society] which make it impossible to feel psychologically free" (Bartlett 1993, p. 71).

One of the ways this whole process comes about, according to Bonatti, is that mountaineering is a natural "next step" for people who live around mountains. Referring to early mountaineers, Bonatti states that after they had explored the valleys and passes they "felt the urge to conquer the summits" (Bonatti 1974, p. 71). As the routes to the summits became harder and more technical Bonatti states, "Mountaineering really transcended its origins, assuming an almost philosophical significance. I would say that it acquired a soul, and from there went on to become an active and heroic expression of our age" (Bonatti 1974, p. 71). That expression is the escape from the doldrums of collective society and the freedom and elevation of the human spirit coming from contact with wild nature. Bonatti continues:

> Knowledge and wisdom are both essential to human progress, but they are not the same thing, as philosophy has long reminded us. However, let us accept our so called social conquests; let us disembark on the moon and other planets in our insatiable pride; only let us not forget that the destiny of man is to become ever more human. That is what the wise, useless, 'mad actions' of our present-day heroes are meant to remind us (p. 73).

What is the purpose of mountaineering? To gain in things material? No. The purpose is as stated by John Muir, the nineteenth century American mountaineer:

> Climb the mountains and get their good tidings. Nature's peace will flow into you as sunshine flows into trees. The winds will blow their own freshness into you, and the storms their energy, while cares will drop off like autumn leaves" (Muir 1979).

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Impacts of Technology on the Meaning of Wilderness

William T. Borrie

Abstract—Of the many societal threats to wilderness, the impact of technology is one of the most troublesome. Certainly, technological innovation has enabled many people to enjoy the values of wilderness. There is, however, a hidden cost associated with those technologies. Technology not only changes the wilderness experience, but it has the potential to change the very meaning of wilderness. Technology can manipulate our wants, needs, and expectations. It raises a particular view of wilderness to greater prevalence, and it may mask our ability to distinguish and determine what is lost in so doing. The adoption and endorsement of technology is largely irreversible. There is a need to carefully shape policies that can keep pace with technological advancements. Once crafted, those policies and the technological intrusions they endorse will continue to mold wilderness as we know it.

Technology has the potential to act both within and outside of wilderness. It has the ability to not only shape what wilderness is experienced to be, but also our expectations of what wilderness can and should be. Technology changes not just the wilderness experience, but it also changes us. As Mander (1995, p. 103) suggests, "the important point about a technology is not what it delivers in its apparent content (for example, the TV program), but what the technology causes to change in society: how it alters knowledge, thought, experience, participation, power." Any wilderness policy that deals with technological issues, such as the prohibition on mechanized transport, needs to examine the impact on the content of the wilderness experience as well as the impact on the knowledge, meaning, and participation in wilderness. Without such balanced consideration, it could be difficult to counter any such demands for safer, more universally accessible, and more comfortable wilderness experiences.

Change of Expectations

Technology manipulates our wants and needs of wilderness. Just as Rothenburg (1993, p. xiv) explains, "technology never simply does what we tell it to, but modifies our notions of what is possible and desirable." For example, as lightweight clothing and equipment enable greater mobility, there is greater expectation to travel further, to see more "highlights," and to experience a greater portion of the wilderness area. Technological advances, such as waterproof jackets, have provided greater ability to cope with severe environmental conditions and, therefore, more people are expecting to visit locations previously perceived as too dangerous.

Technology can serve as a buffer between the visitor and the realities of the wilderness environment. We may be too insulated and protected from nature to identify the severity of a situation before it is too late. Wilderness visitors may become less dependent on their own ability and awareness as they become more dependent on technology. For example, as reliance on fuel stoves increases, the ability to build campfires declines. Or as another example, as reliance on Global Positioning System units rises, confidence in the ability to go anywhere is likely to increase, and the willingness to turn back declines. Similarly, the predominance of cellular or mobile telephones raises the expectation that emergency assistance is only a phone call away. Technology can provide a false sense of security and ability to cope. Technology may help people feel that wilderness is smaller, safer, and easier, but is that perception worthwhile? As a result, are wilderness visitors losing the desire and ability to deal with the uncertainties of wilderness on its own terms? Is technology waving in a loss of humility among wilderness visitors? Certainly it is changing our expectations of what we can and perhaps should be able to experience in wilderness.

Loss of the Unknown

One distinct effect of technology is an increase in the knowability of wilderness. Database and memory technology, combined with greater levels of public access, have taken away much of the sense of wilderness as a blank space on the map. It will not be long before characteristics of a wilderness campsite such as predominant wind direction, amount of bare ground, and numbers of fish become available for every campsite in wilderness. Although aiding trip-planning, selection, and reservation of designated campsites, this comes at the cost of a loss of the unknown. The sense of discovery and mystery that can be so much a part of wilderness is lost. Instead of developing local knowledge from direct interaction with the wilderness environment, more decisions and expectations are being based on a mediated or controlled image of wilderness.

The impact of technology in determining which image of wilderness predominates is largely hidden. Technology covers its tracks as Mitcham (1994) suggests: "Modern technology not only covers over or obscures the thinghood in things, it also covers over or obscures the Being of beings, and ultimately itself." People influenced by technologically mediated views of wilderness not only receive a skewed image

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but also have limited ability to distinguish the real from the imaginary. As technology improves, the more influential the image becomes. Wilderness managers and policymakers should be explicit about the images they endorse or allow. Mumford (1950, p. 2) puts this well when he says: "what we know of the world comes to us mainly by interpretation, not by direct experience, and the very vehicle of interpretation itself is a product of that which must be explained."

Regarding wilderness, there could be a call to elevate the role of direct experience, a call for a close examination or deconstruction of the manipulated image of wilderness that technology increasingly allows. Viewing wilderness through technology changes the view of wilderness we receive. In addition, the motivation for providing that image of wilderness may not be consistent with the intents of wilderness and wilderness legislation. As Katz (1997, p. 176) describes, "any organism that is modified through human technology has been subjected to the process of design. It may appear to be natural, it may still be an organism—yet the meaning of its existence, its essence, has changed. It is now an artifact for the fulfillment of human satisfaction."

The loss of direct experience is concerning. Wilderness used to be its own certifier, but now more and more information is available out of context. There is, therefore, a loss of the original referrer, and it is much easier for human views of wilderness to dominate at the expense of learning the truths of wilderness through a humble process of discovery. Strong (1995, p. 162) points out that technological "devices prevent us from crossing the threshold into the wilderness of things. They diminish the extent to which a sense of wilderness reality is established in us."

Technology also has the potential to change our perceptual system. We get attuned to a faster rate of input and, perhaps, a more precise, defined style of presentation. We become less able to understand wilderness in an unmediated mode and more willing to demand that wilderness conform with standards set by the mediated image. In effect, the image is so powerfully attractive that the reality may not fairly compete. Technology is seductive, and as Rothenburg (1993, p. 86) warns, "if we surrender ourselves to blind faith in the transformative power of new technology, we will forget what nature might mean beyond ourselves."

The Upshot

Technology threatens to fundamentally change the way we view wilderness. The question that must follow is an evaluation of to what extent these changes are beneficial, and at what costs are those benefits achieved. It appears that technology is both an enabler and a filter—by making wilderness easier, more comfortable, and more convenient. But what is lost in the process, what wilderness values have been downgraded? We must ask to whom the benefits accrue, since as Postman (1992, p. 9) suggests: "those who cultivate competence in the use of a new technology become an elite group that are granted undeserved authority and prestige by those who have no such competence...another way of saying this is that the benefits and deficits of a new technology are not distributed equally." Technology is not benign. We must ask what is motivating our adoption of technology for wilderness, and whether it is consistent and facilitative of the values of wilderness. There are those who would argue that technology runs counter to the ideas of wilderness, as Katz (1997, p. 174) argues, "the raison d'etre of technology is to increase human power, control and comfort.... Technology ignores the natural world, except as an object to be manipulated, controlled, processed or otherwise used." Wilderness preservation runs counter to this level of human domination and provides a haven from which to critically examine the exigencies of the postmodern, technological world (Birch 1990). There needs to be caution that technology is not simply the irreversible wedge that unduly reintroduces society into wilderness. Once adopted and endorsed, it is unlikely that the influence of technology could be contained.

In developing policies to protect wilderness from the impacts of technology, two questions present themselves: how does technology irrevocably change us and our views of wilderness, and how do we weigh the advantages and disadvantages of technology? That is, how do we determine whether technology is good or bad for wilderness? Whatever policy is developed to tackle these issues will need to be adaptable to constantly changing technology (Freimund and Borrie 1998). Until such a policy mechanism is achieved, it would be wise to slow the adoption of technology for wilderness. Technology is largely an unthinking process with much of it happening by habit (Mitcham 1994). Such incremental changes in the accepted values, meanings, and knowledge of wilderness may prove to be an unwanted legacy of this technological age.

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Water to Drink: Sustaining Watersheds and the People Who Need Them

Susan Lisa Toch

Abstract—Around the world, decreasing water availability and increasing costs of water purification serve as an indicator of our struggle between human demands and the maintenance of ecological functions and processes of natural resources. But while much has been written on the degradation of natural areas, and growing concerns for human health, little has been done to address their connections. While inherently we know that there is a connection between how we use our water resources and the resources available to us, the challenge has been to define this connection in terms that are considered valid, and to apply this knowledge in a strategy for action. This paper outlines the similarities and interactions between ecological and human needs. By exploring the connections between land use, water quality, and human health, we can gain a better understanding of how human effects on ecological processes do, in fact, affect our quality of life.

In the United States alone, over 140,000 people became ill in over 570 documented disease outbreaks linked to contaminated drinking water from 1971 to 1990. Eighteen identified outbreaks occurred in British Columbia, Canada, in an 11 year period prior to 1992. Since then, at least three identified outbreaks have occurred, one at a ski hill near Fernie (where a chlorinating system probably malfunctioned), one in Revelstoke (where treatment was not provided and citizens had lobbied not to provide treatment), and one in Victoria (where an organism not previously known to be spread by water was implicated in a toxoplasmosis outbreak). Drinking untreated surface water has also been implicated as a source of *Giardia* infection, the most frequently diagnosed parasitic infection in Canada. Two thousand cases are reported in British Columbia annually.

Changing Environments, Changing Health?

Current evidence also indicates that emerging illnesses are not as much related to changing disease-carrying organisms as to the changing environments in which they exist. On the global level, AIDS (Acquired Immune Deficiency Syndrome) has become a symbol of the resurgence of infectious illness. But while AIDS is referred to as the most contemporary example of human vulnerability to the microbial world, it is not the only case of such new threats in the 20th century. Since the 1970's, unanticipated infectious outbreaks in the developed world have included Legionnaires Disease, Toxic Shock Syndrome, and Lyme Disease. The resurgence of tuberculosis and cholera has plagued the developing world, as such diseases have risen to epidemic proportions.

Research suggests that the occurrence of certain diseases are initiated or increased when natural habitats are altered. The theory is that disease-carrying organisms probably lurked relatively undisturbed in their natural habitats or primary animal hosts, jumping to humans only in rare cases. Once larger numbers of humans were in contact with these previously undeveloped areas, the conditions to accommodate potential pathogens and the habitats where they could be transmitted also were altered. In fact, in 1992, a panel of infectious disease experts produced a report for the Institute of Medicine stating that "environmental changes probably account for most emerging diseases." There have also been shifts in patterns of disease—from the prevalence of infectious illness in the 1800's to the chronic disease that predominates the Western world today. In fact, in early 1900, influenza, pneumonia, and tuberculosis constituted 23 percent of the death toll. By 1989, heart disease and cancer already made up 54 percent of total mortality. More striking than the 9 percent decline of influenza between 1900 and 1989, is the 24 percent increase of heart disease during that same time period.

And while death rates on the whole have gone down since the 1800's, gaps between race and social class have gone up. While there have been fluctuations in specific illnesses, the occurrence of disease has, in fact, targeted many of the same populations: the young, the old, the poor, and the vulnerable.

In other words, better treatments for people affected by disease haven't necessarily improved overall health; keeping people from contacting disease in the first place has been the significant factor in improved health conditions.

Water Fit to Drink

Specifically referring to the drainage of wetlands, soil erosion, and deforestation, habitat alteration and the degradation of watersheds have been targeted as the "highest risk to human health and quality of life" (U.S. Environmental Protection Agency 1990). These risks ranked higher than any other impact, due to the scale that they encompass, the length of time required for mitigation, and the fact that many effects are irreversible.

More and more stringent regulations have been the response to water quality deterioration. In 1986, the United States Congress passed amendments to the Safe Drinking

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Water Act (SDWA) requiring the Environmental Protection Agency (EPA) to regulate 83 individual contaminants (compared to 14 previously regulated) and to add 25 contaminants to the regulated list every 3 years, indefinitely. These amendments required all public water systems that rely on surface water to have in place by the end of June 1993, either filtration systems or watershed protection measures. While increasing protection measures, these SDWA standards have also increased the possibility of detecting potential pathogens in areas not previously thought to contain them. The additional concerns for disinfectant byproducts like Trihalomethanes (THMs) do not allow for chlorine or other disinfectants to be the sole solution.

The Solution May Become the Problem

The conventional approach to human use of vulnerable ecosystems has been to focus on the "lacks" and "needs" rather than on the potential to manage and protect the mechanisms that allow these resources to exist. In the interaction between people and natural resources, the importance of technology has increased along with the increasing needs for adequate drinking water supplies. The dependence on technological solutions can produce a one-sided, supply-oriented thinking or "getting as much as we need and want" in water management, without a demand-oriented complement that considers "how much and for what purpose water is being used." More and more, the function of technology is to augment—and more recently repair—ecological processes and functions of the natural environment.

In the case of water quality, physical structures like dams or diversion canals and chemical products like chlorine have acquired a prominent position, and deemed a necessary intervention, in public perception and practice. While the use of technology may serve as an immediate solution to crisis, and as a much needed intervention in some instances, the overreliance on technology is not without its consequences. Increasing technological inputs can be costly, directly and indirectly. While some interventions can assist in the replacement or repair of ecological functions, they also can leave scars or influence other side effects. An accumulation of ill effects can break down the mechanisms (health) of the ecosystem, creating vulnerabilities and the risk of human exposure to other forms of disease.

Thihalomethanes (THMs) are formed when chlorine, added to the water for disinfection, reacts with naturally occurring organic matter. They constitute only a portion of a class of compounds formed during the disinfection process called disinfection by-products (DBPs). The health effects of all DBPs are not well understood, but some, such as haloacetic acids (HAAs), are suspected human carcinogens. The most common THM, chloroform, a by-product of chlorine, was shown to cause cancer in laboratory animals. Thus, increasingly strict drinking water standards have created an imperative to limit chlorine use in public water supplies due to the potential for THM formation and related health risks.

Due to an estimated 2,000 deaths from chlorinated water in the United States, in 1979, the U.S. Congress ruled that "low levels of chemicals in drinking water, for which the disinfectant by-products are principal ones, may cause cancer and other diseases, and therefore must be regulated." Up until that point, there was no limit to the amount of disinfectants that could be used in drinking water control, allowing for the continual increase of chlorine to offset increasing degradation of potable supplies. While the reduction of potential disease organisms like *Giardia* through systems that coagulate and filter these organisms out of the water supply may be effective, the economics of maintaining such technological systems are prohibitive in most small communities. According to the British Columbia (BC) Ministry of Health, with at least 700 community watersheds in rural BC alone (75 percent relying on surface water) the economics of maintaining adequate coagulation and filtration systems are prohibitive.

Increasingly artificial interventions in the purification and filtration of drinking water are less and less cost effective, and are now themselves defined as possible health hazards. This leaves watershed management a viable and necessary alternative.

A Natural Alternative

Ecological factors play an important role in determining the outcome of disease. While many water-related species may naturally exist in the hydrologic environment, changing ecological processes and functions can also change the hydrologic regime. These may affect the introduction, concentrations, and transport of disease-carrying or pathogenic micro-organisms and parasites. Consequently, the transmission of water-borne disease can exist.

Land use activities have been known to affect rates of river flows, soil infiltration characteristics, and storage capacities (U.C. Water Resources Center 1991), and decline of water quality has been correlated with the influx of disease (World Health Organization 1984). While most land use activities can be associated with ecosystem change, resource use does not necessarily constitute a contamination source. It is the methods by which human activities occur on a watershed that has the potential to promote or reduce mechanisms for human illness. The degree and extent of specific land use practices can also be identified and controlled. Ultimately, it is our accumulated demand on water resources and the methods by which this use occurs that will determine the degree and source of potential impacts to ecological systems. Watershed management is a strategy to deal with current trends of resource use that threaten to impair water quality, and as an economically viable alternative to technological advancement.

From Hydrology to Drinking Water

The Tuolumne watershed is a major Sierra Nevada river system that has its source within the boundaries of Yosemite National Park. Since passage of the Raker Act in 1913, San Francisco County has depended on the Tuolumne River Basin for much of its domestic water and electrical power. Approximately 85 percent of the City's water supply is derived from the Hetch Hetchy Reservoir system, a series of watersheds connected along the Tuolumne River. Land use varies from the wilderness areas of Yosemite Park and the

Stanislaus National Forest to the more developed areas in Tuolumne Meadows, Big Oak Flats, and Moccasin.

To comply with SDWA regulations, the San Francisco Water Department (SFWD) was required to construct a 300 mgd filtration plant, estimated at $500 million, in 1993. Along with the already growing financial problems of the City, this amount had the potential to double current water bills for all water users. With the headwaters of their potable supply within National Park boundaries, the City sought an exemption from the filtration requirement based on the "quality of the natural source." They opted for the "watershed protection measures." The Tuolumne River Watershed and the San Francisco Water Supply outlines the first filtration exemption in the State of California, granted by the California Department of Health and the Environmental Protection Agency to the San Francisco Water Department (1993). Components of the Sanitary Survey that documented water quality issues are used here to demonstrate how the ecological assessment of resource use can be related to public health concerns (Toch 1994).

Location, Location, Location—The Hetch Hetchy Watershed was chosen as a site for the San Francisco Water Supply, in part because of its location; that is, one that was far away from the City's development conflicts. The pristine nature of the source is attributed to the fact that the majority of the watershed is under federal protection, with limited land use. The deemed quality of the supply thus demonstrated the value of resource preservation.

Ecological functions of the natural environment that included intact soil structure and indigenous vegetation cover could serve as natural purification devices. Human impact was minimal in sensitive meadows, fragile soils, or riparian zones. However, federal mandates requiring resource preservation decrease as one moves downstream, with increased development and resource use occurring on leased and private land. These watersheds are considered more risky relative to current EPA Safe Drinking Water parameters for human health. Certain land use practices serve as a specific threat to water quality and greatly influence the potential on these above mentioned parameters. These include:

1. Inadequate human or animal waste disposal.
2. Frequency of occurrence and density of domestic and/or wild animals occurrence.
3. The type and duration of soil impacts and runoff potential.
4. Land use activities that initiate a pollutant source, or create pathways for pollutant transport.

The "location" of these practices in relation to specific watershed characteristics is of significance, as an activity (such as sewage discharge) may be of concern in an environmentally sensitive area (such as on highly permeable, erodible soils), while not causing degradation in another area (such as clay soils). The cumulative effects of land use activities may not be directly associated with source pollutants. However, these may also contribute to water quality degradation.

For example, logging practices that initiate soil erosion, a physical process associated with increased turbidity, may alter water quality. However, that same activity may be performed in an ecologically sustainable fashion. Vegetation serves to stabilize soil structure. Often, indigenous species have specific characteristics suitable to the native soil. By maintaining suitable herbaceous cover, it is possible to reduce both resource degradation and potential contamination of the water supply. Watershed management can be a viable and necessary means to water quality control.

Indicators of Risk—There are four constituents of primary interest in maintaining current potable standards for water supplies, and they are discussed here. Indicators of potential pathogenic agents transmitted by water include Coliform and Turbidity. The flagellate *Giardia lamblia* and the sporozoan *Cryptosporidium* sp. are intestinal parasites prevalent in the United States.

Coliform bacteria are indicators of the presence of disease-causing (pathogenic) bacteria in drinking water. Waters free of Coliform can be considered to be free of pathogens. There are also known to be at least four types of infections that originate with the ingestion of E-coli. These range from gastroenteritis to severe diarrhea. Some bacteria are commonly found in organic, decaying matter and in soil and water. Potential contaminant sources are generally related to fecal matter and urine.

The occurrence of Turbidity in a water supply has been related to the shielding of potential pathogens from disinfection. It has also been associated with the need for increased chlorination and as a transport mechanism for pollutants. Contaminated sources have been associated with land use practices that impact soil characteristics.

Giardia and *Cryptosporidium* are enteric protozoa that cause water-borne diseases. Both are transmitted by the fecal-oral route, with the infected individual excreting *Cryptosporidium* oocysts or *Giardia* cysts. Animals as well as humans may serve as sources of environmental contamination and human infection. Parasites and Coliform may be found along the watershed and transmitted to the water supply via hydrologic pathways. They may be transmitted by mammals and are commonly found in streams and rivers.

The American Waterworks Association (AWWA 1993) recommends guidelines for water quality assessment that include a list of potential contaminant sources. These originate with specific land use practices. Table 1 describes these representative land use practices within three drainage basins of varying development activities in the Hetch Hetchy water supply.

Specific land use practices can also be analyzed with respect to their impact on biological, physical, and chemical functions of the hydrologic environment. Table 2 describes some of the biological, physical, and chemical processes that, in turn, affect water quality. These are associated with potential identified land use impacts in the Tuolumne River Watershed.

With an eye on ecological integrity, the relationship of these land use impacts on specific water quality parameters is described in Table 3. This demonstrates the correlation between activities that alter specific hydrologic functions and processes, and ultimate change in human health parameters—with resulting implications for human well-being.

Integrating Resources—Data collection strategies have often focused on specific point source pollutants such as sewage discharge facilities, rather than on the mechanisms that initiate or perpetuate pollutants. Rather than focus on individual constituents or indicator species, it is possible to assess the process through which pollution occurs.

Table 1—Land use activity by watershed in the Hetch Hetchy Water Supply System.

Land use activity	Watersheds[a]		
	Hetch Hetchy	Moccasin	Priest
Agriculture/crops	N/A	S, I	I
Grazing	N/A	S, I	S, I
Logging	N/A	I	I
Mine runoff	N/A	S, I	S, I
Fire	S	S	S
Concentrated animal facilities	S	I	I
Wildlife	S	I	S
Chemical use	S	S	S
Urban runoff	N/A	N/A	N/A
Recreational/visitor use	S	N/A	N/A
Undeveloped land	N/A	N/A	N/A
Unauthorized activity	S	S, I	S, I
Groundwater discharges	I	I	I
Industrial facilities	N/A	N/A	N/A
Solid waste disposal facilities	N/A	S	
Hazardous waste disposal facilities	N/A	N/A	N/A
Roads	S	S	S
Hazardous material transport	S	S	S
Commercial	S	S	S

[a]I = Insufficient information, N/A = Not applicable, S = Source present (revised from Hetch Hetchy Sanitary Survey, 1993).

Table 2—Land use activity related to potential source contaminant.

Land use activity	Process	Potential source
Agriculture/crop	B,P,C	Poor tillage practices: erosion, soil compaction
Grazing	B,P	Cattle affect riparian growth, erosion/compaction sewage directly in water supply
Logging	B,P	Roads, impacts on riparian stability, erosion
Mine runoff	P,C	Abandoned mines, chemicals
Fire	B,P	Erosion, wildlife
Concentrated animal facilities	B,P	Sewage runoff, erosion
Wildlife	B,P	Compaction, sewage runoff (though it is often sporadic enough to be dispersed)
Chemical use	C	Depletes natural environmental defenses
Urban runoff	B	Inadequate septic
Visitor/recreational use	B,P	Improper trail maintenance, lack of septic facilities in ESAs
Unauthorized activity	B,P,C	Unregulated use; erosion, runoff
Ground water discharge	B,P,C	Carries pollutants into surface supply
Undeveloped land		Important as reference baseline for ecosystem maintenance
Population growth	B,P	Concentrated facilities on ESAs
Wastewater treatment facility	B	Inadequate facilities for ecological site criteria
Solid waste disposal facilities	B,P,C	Concentrated sewage
Roads	P,C	Transports, waste, erosion
Hazardous material transport	C	Potential accidents
Commercial	B,P,C	Inadequate maintenance for sites

[a]B = Biological, P = Physical, C = Chemical, ESA = Environmentally sensitive area.

A comprehensive analysis of pollutant sources and the attendant land use impacts can thus identify the potential for water quality degradation. The components of such an analysis should include geographic correlations of water quality parameters within the watershed as a whole. With a base map of the hydrologic system, ecological characteristics of the watershed can be defined as (1) precipitation (for input), (2) tributaries and flow patterns (for transport mechanisms), and (3) geology, soils, and vegetation (for storage and filtration). An overlay of land use activities can include concentrations of animals, sewage discharge, grazing, or mining.

By connecting the ecological characteristics of a watershed with the land use activity, a specific location point is defined. Sample points can be identified along the watershed to coincide with these processes. Water quality data can thus be associated with a specific land use practice and the location where it occurs, identifying the mechanisms for impact.

Table 3—Significance of land use impacts to primary water quality parameters in the Tuolumne River Watershed.

Land use activity	Water quality parameters[a]			
	Coliform	Turbidity	*Giardia*	*Cryptospordium*
Agriculture/crop	✓	✓	✓	✓
Grazing	✓	✓	✓	✓
Logging	—	✓	—	—
Mine runoff	—	✓	—	—
Fire	✓	✓	—	—
Concentrated animal facilities	✓	✓	✓	✓
Wildlife	✓	—	✓	✓
Chemical use	—	—	—	—
Urban runoff	N/A	N/A	N/A	N/A
Recreational/visit or use	✓	✓	✓	✓
Undeveloped land	N/A	N/A	N/A	N/A
Unauthorized activity	✓	✓	✓	✓
Groundwater discharges	N/A	N/A	N/A	N/A
Industrial facilities	N/A	N/A	N/A	N/A
Solid waste disposal facilities	N/A	N/A	N/A	N/A
Hazardous waste disposal facilities	N/A	N/A	N/A	N/A
Roads	✓	✓	—	—
Hazardous material transport	—	—	—	—
Commercial	✓	✓	—	—

[a]N/A = Not applicable (revised form Hetch Hetchy Sanitary Survey, 1993).

MechanismsÆ LocationÆ Indicators

By associating potential pollutant processes with specific land use practices, inconsistent policies can also be targeted. For example, the Taylor Grazing Act (Section 15) permits open range rights on utilities and public water supplies. Grazing has been associated with the physical impacts of compaction and erosion. *Giardia*, *Cryptosporidium*, and Coliform bacteria are known to come from cattle manure. The potential for grazing to be a contaminant source can be correlated with the geographic location where it occurs.

By allowing grazing along the riparian zone (an environmentally sensitive area), or within the water supply itself, the ecological integrity of the system is altered. Impacts include the resulting compaction that would decrease herbaceous cover and the natural filtration capacity of the soil. This would leave the area more vulnerable to insult. Biological pollutants are more easily transported by erosion. With fewer natural purification mechanisms, the accumulation of these insults can more easily alter water quality parameters and increase potential for illness. The occurrence of disease can then be related to human contact and susceptibility. Grazing as a form of land use thus directly conflicts with objectives stated in the Clean Water Act and SDWA criteria if impacts are incurred without regard to the hydrologic system (Toch 1994).

From this information, two tables can be constructed that focus on processes of water quality impacts and natural mechanisms for water quality control. These can list land use practices, geographic location, effects of land use practices on the physical, biological, and chemical ecosystem processes, and resulting impact on water quality parameters; in this case, Coliform, Turbidity, *Giardia*, and *Cryptosporidium*.

Table 4 identifies mechanisms for water quality degradation. Table 5 focuses on ecological characteristics that serve to protect and maintain water quality.

Sustaining Waters

Quality assurance means a combined approach aimed at the preservation and maintenance of hydrologic processes within a specific watershed. Directives should be geared toward the enhancement of viable ecological functions of purification and filtration, mechanisms for "natural water quality control," as well as the management of land use practices to prevent adverse impacts to the ecosystem. Goals for best management practices in water quality control should include preservation of wetlands, protection of riparian habitat, promotion of native vegetation, and maintenance of soil integrity. These criteria should be complimented by an additional set of guidelines that aim to reduce the mechanisms of water quality impact through appropriate land use practices in sensitive areas.

With data collection that integrates ecological processes with points of impact, management strategies can be used to promote natural mechanisms for water quality maintenance and control as well as reduce undesirable land use effects. A hydrologic buffer zone should be first established based on the geographic drainage area. Mechanisms for water quality maintenance or impacts to hydrological processes can then be targeted.

By linking biological, physical, or chemical processes to an activity source, those agencies responsible for the monitoring and control of these activities can also be coordinated. Management strategies and policy directives can then be geared to the protection and maintenance of hydrologic processes. This approach can serve as a basis for the

Table 4—Water quality degradation.

Land use practice	Location	Effect	Resulting water quality (T,C,G,CRY)
Construction access roads	Steep slopes	Erosion/compaction	Increase turbidity
Septic system siting	Fractured hardrock	Waste discharge	Increase Coliform, *Giardia*, *Cryptosporidium*
Culverts	Tributaries/wetlands near roads	Pollutant transport	Increase turbidity, Coliform, *Cryptosporidium*
Elevated water levels for hydro-power	Hetch Hetchy, Priest, Moccasin Reservoirs	Erosion	Increase turbidity

Table 5—Water quality control and maintenance.

Land use practice	Location	Effect	Resulting water quality (T,C,G,CRY)
Allow for native species	Steep slopes, riparian areas	Soil stabilization, filtration capacity	Decrease turbidity
Maintain sensitive wetlands, natural ponds	Fractured hardrock	Waste discharge	Decrease coliform
Protect soil stability	Tributaries/wetlands near roads	Pollutant transport	Decrease turbidity, Coliform, *Cryptosporidium*

identification and development of effective risk assessment and management alternatives that focus on an increased awareness of the tradeoffs inherent in every resource decision. By incorporating a methodology that considers resource and health criteria, human welfare concerns can be managed in accordance with hydrologic constraints. The connections between land use, water quality, and human health place the preservation of hydrologic processes in the context of human health and well-being.

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Coming Home to the Wild

Florence R. Shepard

Abstract—Paul Shepard's book "Coming Home to the Pleistocene" (Shepard 1998), written during the last months of his life, is like a mirror held before us "thinking animals" that reflects our primal human being. This image (if comprehended and lived fully, Paul counseled) can make us at home on planet Earth, rather than ecological misfits. We recognize this image, for at the heart of our identity is a fundamentally wild being, one who finds in the whole of wild nature all that is true and beautiful in this world.

In his address at the 5th World Wilderness Congress in 1993, Paul Shepard (1998) put forth more assertively than ever before an idea he had been tracking for years. We are, he proclaimed, wild to the core. Furthermore, our self-consciousness and world view are based not on the teachings of civilization but rather on the biological legacy as well as the cultural influences passed on from our ancestors, the Pleistocene hunter-gatherers.

He elaborated further that our genome, the genetic inheritance that identifies us as humans, has remained relatively unchanged for the past 10,000 years. When we walked out of the Pleistocene we were essentially the same beings as we are today. In fact, because of the slow mutation rate of genes in humans, our genome is essentially as it was 100,000 years ago when ancestral humans roamed the earth. And that genome, in turn, was the culmination of the evolutionary change in still more ancient primate ancestors whose brain size and body weight increased threefold in the relatively short span of 2,000,000 years. We are, for the most part, he insisted, the same creatures who came down out of the trees on the forest edges, placed our feet firmly on the ground, looked around in an innately suspicious primate fashion, and began the game of chasing and being chased.

Much smaller than the large carnivores, we developed the acumen to watch predators and prey around us, for we were both, and we learned from our adept fellow creatures. Animals became our teachers, shaped our perception and cognition, and gave us the basis for music, dance, ceremony, and language.

From the beginning, we were omnivorous and gathered what was plentiful to eat, understood the phenology of the seasons, hunted accessible small animals, and scavenged large dead bodies. Paul insisted that our most prized cognitive skills (that we wrongly attribute to the influence of civilization)—the ability to think and plan ahead, to match our intellect with others in collaboration, to synthesize many bits of information in appraising situations, to read signs, to create symbols that convey information, to design beautiful artistic expressions, to find joy in music and celebration and communion, to solve insurmountable obstacles through the use of cunning, and to relate existence to the cosmos and acknowledge the spirit world—were not the legacy of civilization but were bequeathed us by our hunter-gatherer forebears.

But our cunning has turned against us in these last 10,000 years as we have over-stepped our human bounds and ignored the "limits of the natural order" (Turner 1998). We have changed the face of the earth more rapidly and more destructively than any meteoric catastrophe; our mindless exploitation of the Earth's limited resources has placed this planet in an ecological crisis since the turn of this century.

These changes came about as the result of two concomitant movements—through the domestication of plants and animals and the sedentary life that agriculture promulgated as well as through pastoralism, the keeping of herds that created the conditions for ownership and surplus and scarcity that stratified humans into classes. And with the horse and its harnessed power came the capacity for invading and conquering others.

Along with these changes in lifestyle arose a different spirituality. Mounted powerfully on prancing steeds, we turned our eyes and hearts away from the spiritual and ecological sustenance of the earth and looked skyward for a god, or gods, to save us from an earthly existence. We began to see life not as a seamless intertwining of past and present, but as a linear set of chronological events beginning in the past, coming to the present, and leading on to the future. This life was not enough to satisfy us; we wanted paradise and immortality. We abandoned the wisdom of our own instincts, denied death as a part of the ever-renewing cycle of life, and in the end, rejected the numinous Earth as the source of life in favor of a material world where we were supreme, rational beings.

Although during the first two decades of his adulthood, Paul Shepard lived an optimistic, tempestuous life of environmental activism, this turning away from the wisdom of the Earth worried Paul in his later years. In the early 1970's, he "became disillusioned with the environmental movement…and no longer believed that understanding the meaning of ecology would make any difference in turning the public's consumptive mind to a more sustainable economy" (Shepard 1998). At that time he began looking deeper into the origins of our problems, and in his writing presented what some think was a prophetic and visionary

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message. This thoughtful enterprise led him to explain Western perceptions of ecology, animals as the language of nature, and the ontological (developmental) framework of the human life cycle. Through his research he became firmly bonded to the ancient hunter-gatherers and dreamed of a time when there was no distinction between the wild and the tame. This thinking led him to discern the differences between the two concepts of wildness and wilderness.

Wildness, he said, is the state of our genome, our evolved genetic endowment that has been honed by evolution over millions of years. Like other uncontrolled creatures on Earth, he maintained, we are a wild species because our genome has not been altered with certain ends in mind as have the genomes of domesticated plants and animals that we have manipulated for our own purposes. Paul agreed with philosopher Holmes Rolston who said that wildness is not just something "behind" and separated from ourselves, but is the "generating matrix" for what we are (Rolston 1983). Although we have taught each other social and cultural conventions in order to live together, and although we are creatures that can adapt to deficient environments, we are more at peace, less stressed, and more sane in environments that resemble the ones in which we evolved. That primal landscape, he reminded us, is still etched on our brains and is recognizable and familiar to us. Without it, he insisted, we are ecological misfits and often physical and mental wrecks.

Wilderness, on the other hand, is both a cognitive construction and a place we have dedicated to wildness that provides the optimal conditions for the wild genome's elaboration. We think of it as a place set aside, a realm of purification outside civilization with beneficial, therapeutic qualities, a release from the over-developed environment and the disease of domestication. But we take wilderness too literally, too legalistically, he advised, and in the process we lose the meaning for which it was intended, the place where wildness can flourish.

Early in his career, Paul Shepard gave up writing and thinking about wilderness landscapes as a key to our sense of nature. He felt we had been corrupted not only by domestication but by the conventions of nature aesthetics, where we had been steered by Freud's psychology depicting us as creatures destined to suppressing sexual or combative urges. Nature, he asserted, has been oversold for four centuries as an aesthetic as opposed to a religious experience—even the spiritual uplift of wilderness is burdened with our egocentric human purposes. When wilderness became a subject matter in art, the criteria of excellence became technique. In such a context, the real landscape is objectified and distanced through photography or landscape painting, or for that matter, through nature writing. As a consequence of this abstraction of nature as art, masses of people who are not interested in art analysis regard the extinction of animals, demise of old-growth forest, pollution of the sea, and the whole range of environmentalist angst as "elitist." Wildness, he cautioned, cannot be captured on film or on canvas; wildness is what we kill and eat because we, too, are wild and are also eaten. We are a part of a sacred trophic community.

Paul warned us that the corporate world has drawn our attention away from wildness by negotiating parcels of wilderness too small to allow random play of genes. This establishes a dichotomy of places and banishes wild forms to enclaves where they are encountered by audiences while the business of domesticating and denuding the planet proceeds unabated.

In a closing statement of his last book, Paul declared his own "primal closure." "We go back," he said, "with each day…with the rising and setting of the sun, each turning of the globe…to forms of earlier generations…we cannot avoid the inherent and essential demands of an ancient, repetitive pattern" (Shepard 1998). He implored us to return to the integrity of our genes, to trust them and follow their lead, and to acknowledge our ontogeny (the biological pattern of growth and development during our life cycle) that we inherited from our primal ancestors.

Our life-long development brings with it physical changes that occur rapidly during the first years of life, and with these changes come differing psycho-social responses. To these changes within each of us, however, there must be appropriate responses in the culture to mitigate our neoteny. Neoteny is that strange immaturity retained by humans throughout our life cycle that makes us dependent on others and on the culture for help and support our whole lives through as we confront critical life passages.

Young children require the firm nurturing of loving caregivers, but as they grow and become more self-sufficient they increasingly need opportunities for exploration in nature. Their cognitive development begins with the taxonomy of animals, who are like us and yet so different, who provide not only the basis for language categories but the psychological basis for otherness, the understanding of difference apart from the self. These initial explorations in childhood promote our identity formation as well as develop the capacity for symbolic and metaphoric thought.

Progressively more independent explorations in familiar terrain widen and deepen children's experiences. They begin with the topography of their mother's and their own bodies and move progressively outward until their identity takes in other creatures as well as their surroundings. Eventually, as adolescents, the recognition of universe and cosmos blossoms, and at this time, their astonishing zeal should be accompanied by story and music and celebration from the adult community to match their expanding cognition and spirituality.

In the ideal world of our ancestors, children and youth, as well as adults, live lives richly textured with play, sound, and movement, and shared in common with people of various ages. Segregation by age groups is not a wise practice, Paul advised. Without close contact and mentoring, preferably by adults who are not parents, youths, longing for affiliation, congregate in groups (gangs) and try in their own immature ways to "grow themselves up." But without guidance and bonding to nature and its wild creatures, they grow into immature adults, ignorant of their place in an ecologically sustainable community.

In a neo-primal community, adults find full and active lives in place with emphasis on small group collaboration, some independent family subsistence and sharing, self-restraint in accumulation of material wealth, diverse activities, and less emphasis on the individual household and more on the sharing community. Prestige comes from integrity rather than from inheritance or fame. Participation and broad representation in the political realm is

expected of all. Leadership is dispersed, emergent, and dynamic; gender relations are egalitarian. Elders are important keepers of stories and are revered and cared for.

Paul used the "fire circle" as a metaphor as well as a literal example of community in which a small, cohesive group is bonded in discourse, communion, celebration, mutual support, and enlightenment—an interesting idea around which we can fashion families, communities, and work groups. Important events, like birth and death, are seen as the binding matrix of spiritual existence. In such a plan, no one is neglected or relegated to others. No one is unimportant. We each take responsibility for others and they for us as we give care, support, recognition, and respect.

The primal community has many applications in our modern world. It means living more firmly in place but allows for periodic peregrinations or pilgrimages. With rapid communication, we have opportunities to keep our fire circle cohesive and the members strongly supportive of each other, even when they are separated by continents. Narrative is a central motif. An integrated spirituality pervades all aspects of life that brings a respect for otherness. In a healthy and active community, members acknowledge their need for ceremony that makes explicit their interdependence.

Welfare of other creatures and of the earth comes first, not last, in the order of business in all arenas of decisionmaking. Paul Shepard saw this community closely tied to sacred trophism through the practices of hunting and gathering, where omnivory is the dietary plan with sacramental rather than sacrificial trophism. Rather than restrictions, more emphasis is placed on the freedom of people to make choices to accommodate their developing psyches. This is the life cycle we inherited. This, implored Paul Shepard, is the life cycle we should acknowledge.

In terms of the larger view, Paul saw a world made up of three composite systems: genetic systems, ecosystems, and cultures. Each system is a mosaic of independent and distinct parts that are portable yet embedded, that can be exchanged and recombined in an "integrated and lively conglomerate." These three systems lie in horizontal proximity, each affecting the other and responding to the other. Although the genes dictate the range of feasibility, they carry millions of years of possibilities for the interwebbing of creatures in ecosystems. Cultures arise in response to the elaborations of genes and ecosystems and can result in rich and diverse human and creature-friendly societies and environments.

We cannot ignore what is possible in our own lives, within our family groups, and among our neighborhood communities. Here, in this essential matrix, appropriate cultural responses can stabilize our home place and spill out into the world at large. But our purpose in formulating plans must be to be true to wild nature within and outside of ourselves. Our wildness, as Paul saw it, is not some dream of a future paradise, but aspects of community within which our primal ancestors lived. We have only to go back to this wisdom and bring it into our lives in every way possible.

We are all brothers and sisters in our genetic endowments, essentially alike, essentially wild. Cultures may differ in their ecological integrity and practices, but individuals within those cultures are made from the same stuff, feel in the same way, and think and communicate in surprisingly similar modes. In his life work, Paul Shepard chose to think about our wild nature within a greater ecological community. He worked through the errors we have made, pointed them out to us, and hoped that we will pick up his work and carry it forward. Throughout his life, his writing was a model of consilience; the unity of knowledge that E. O. Wilson has told us in his recent book is needed if we are going to preserve life on earth (Wilson 1998).

I spend some time each year in a cabin in the Hoback Basin in the Greater Yellowstone Bioregion of the Northern Rockies of North America. Designated wildernesses as well as healthy public lands and national parks abound in this region. The headwaters of three great rivers of the Western United States are born here. If anyone were to say to me that wilderness areas are a thing of the past, that they cannot be sustained, that they are not important or needed, or that it is too late for wilderness, I would argue steadfastly. Granted, my idea of wilderness is unique to the place where I live; there are other definitions of wilderness throughout the world appropriate to other cultures and other bioregions. But, as Paul Shepard told us, at base they must have one common purpose. They must be places that sustain wildness where the free play of genes is allowed to take its course.

We can view and define wilderness from differing cultural perspectives, but when we talk about the wild we are, I believe, of one heart and mind. There is nothing relativistic about wildness, nothing to be negotiated. Genes are either wild or they have been tamed. Wildness does not depend on the context. It is something fundamental to all our understandings and is not culturally based or socially constructed. We can all recognize it when we see and hear it, for it resonates within our own essential wild nature. It is the reason we are here. It is the reason we are fighting for endangered species, for wilderness designations, and for our human being.

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In Wilderness There is Life: An American Indian Perspective on Theory and Action for Wildlands

Linda Moon Stumpff

Abstract—The concept of "origins," as it relates to wildlands from a Native American perspective, emerges from a cultural understanding of the balancing relationships between humans and nature. Although the concept of origins in this context carries cultural meaning, it is firmly rooted in the ecology of place and long-term experiential knowledge. An examination of multiple and distinctive tribal understandings of wildlands specific to place leads one to some general philosophic principles. These are demonstrated through environmental practices on various tribal and public lands such as the Mission Mountains Tribal Wilderness (Salish-Kootenai Tribe) and the Sacred Blue Lake (Taos Pueblo). Wildland practices here are value driven and an ethic of reciprocity is embraced. Collaboration with tribes and the acceptance of indigenous knowledge are important contributions to protecting on-tribal lands already under wilderness designation and for creating and maintaining alternative models for the protection of wildland values.

The essence of wilderness is not in arguments over postmodern definitions, but in its value as places of origin and life. The idea of wildness as life itself stretches across American Indian cultures in North America. Crowfoot, of the Blackfoot Indian Nation, related life to wilderness when he spoke in 1890 as he lay dying and near starvation after watching the wholesale slaughter of the buffalo on Indian lands ceded to the Canadian government:

> What is life? It is the flash of a firefly in the night. It is the breath of a buffalo in the wintertime. It is the little shadow which runs across the grass and loses itself in the sunset.

The cultural significance of wilderness encourages a balancing relationship between humans and nature. It is the primary reason why involvement by indigenous people is critical to future and existing initiatives to sustain wilderness ecosystems. Where value drives use, an important philosophical reordering of human relationships to the environment is created. Tribes maintain a significant knowledge base relevant to sustainable practices within their cultures. In addition, much of the land needed to sustain ecosystems upon which wildness depends is outside designation under the Wilderness Act, as has been noted in previous years by the Wildlands Project. Tribes hold a significant amount of land (5 percent of the United States) that must be considered in efforts to develop a sustainable system.

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The United States and European countries signed treaties with North American Indian Nations as sovereign governments under the canons of international law. The treaties established a unique forum for protection of indigenous rights and self-governance.

Through treaties or Executive Orders of the President of the United States, reservation lands are homelands with reserved rights that are implemented as property rights. Tribes often hold senior water rights. Under the policy of self-determination, tribal governments are staffing their own professional departments and writing their own decision documents. Unique forms of wilderness designation on lands separate from public lands designated under the Wilderness Act of 1964 are evolving. Treaty rights to hunt and fish extend regulatory influence beyond tribal reservation boundaries.

Four Points of Understanding

Spirit

There are four key components for understanding the role of indigenous people in sustaining wildlands. First, a deep connection to wildlands is embedded in the philosophy and spirit of American Indian tribes. For many tribes, wildlands represent the origin of life and its sustenance.

Ecology

Second, it is important to recognize that tribes possess a critical body of knowledge about wildlands as ecological benchmarks within complex cycles. Matthew King, a Lakota Sioux, understood dynamic change in nature: "Volcanoes, hurricanes, and earthquakes will happen. They will come. So just tell them the noble Redman told you that." On the Klamath National Forest, American Indian basketmakers have taught Forest Service crews to apply prescribed burns at lower temperatures and in more selective plots, demonstrating their accumulated knowledge about the role of fire in local ecosystems.

Knowledge

Third, it is critical to understand the objectives of American Indian practices in wildland areas. Physical scientists map ancient fire scars resulting from prescribed burning by indigenous people, their marks left like fingerprints on the cycle of forest history. American Indians are the only people in the United States with culturally transmitted knowledge of the factors that have driven change in the 200-to-800-year

cycles of growth that scientists consider. Okute, a Teton Sioux, illustrated this awareness as he spoke in 1911:

> An animal depends a great deal on the natural conditions around it. If the buffalo were here today, I think they would be different from the buffalo of the old days because all the natural conditions have changed. They would not find the same food, nor the same surrounding.

Governance

The practical exercise of culturally based governance, sustained by the knowledge of place, completes the fourth portion of the circle of shared understandings. Despite depredations and poorly formulated advice from federal managers in the Bureau of Indian Affairs (in the United States Department of the Interior), much reservation land remains less damaged and developed than adjacent public and private lands, so far.

Indigenous people know the land and they know where the animals are; they live there. The Hopi Tribal Delegation, in a Statement of Commitment to the Land issued in 1929, understood that:

> We the traditional leaders want you…to know that we will stand firmly upon our own traditional and religious grounds. And that we will not bind ourselves to any foreign nations…We have met all other rich and powerful nations…all of whom have used force in trying to wipe out existence here in our own home. We want to come to our own destiny in our own way.

Four Roads to Collaboration: Distinctive Tribal Conceptions of Wildlands

Successful construction of future strategies to protect indigenous relations to wildlands depends on understanding cultural differences. The American Indian conceptualization of wildlands embraces the notion of a cultural heartland encompassing natural components and processes. Traditionally, the European colonists separated the natural and cultural dimensions. The colonial philosophy of Manifest Destiny guided "civilization" of the Western United States through agriculture. It constructed a moral authority of human superiority. Standing Bear, an Oglala Sioux, noted:

> We did not think of the great open plains, the beautiful rolling hills and the winding streams with tangled growth as 'wild.' Only to the White man was nature a 'wilderness' and the land 'infested' with 'wild' animals and savage people.

From the Indian perspective, value drives use; therefore, value is reinforced by human use and presence in the cycles of natural processes. The Wilderness Act of 1964 defines wilderness as "an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain" (Public Law 88-571). Yet Goyathlay, known to the world as Geronimo, spoke of the wildlands of Arizona as home:

> There is no climate or soil, which, to my mind, is equal to that of Arizona, that land which the Almighty created for the Apaches. It is my land, my home, and my fathers' land, to which I now ask to be allowed to return. I want to spend my last days there, and be buried among those mountains.

The second cultural distinction is the connection between wildlands and spiritual value for American Indians. It extends beyond geographic description and life cycle. Human-defined boundaries are not relevant. Chief Joseph of the Nez Perce explained the problem:

> The earth was created by the assistance of the sun, and it should have been left as it was…. The country was made without lines of demarcation, and it is no man's business to divide it.

The third distinction is the American Indian ethic of reciprocity. A gift calls for something in return. Historically, American Indians sustained life through a variety of practices based upon observed historic variation in the environment. At Yosemite National Park, Jay Johnson of the Ahwahnee tribe worked to convince the National Park Service to allow the collection of a sensitive species of willow for ceremonial use. After gathering, the remaining willows (no longer choked by unnatural density) thrived.

The fourth distinction emerges from restoration. Embedded in American Indian cultural traditions is the idea that human actions have uncertain results, and that results often occur outside human control. Restoration is undertaken with humility, in reaction to human error, and must be approached with more humility. Tribes must work as sovereign nations, in coordination with United States government agencies, to develop ecological restoration initiatives. Some areas under tribal control will be quite difficult to include in wilderness protection due to their ecologically degraded state. Herein is a powerful line of reasoning for supporting American Indian participation in wilderness designation and active restoration.

Some sacred cultural sites, valued for spiritual restoration, are many miles within designated Wilderness areas, which precludes the use of vehicles. A government official once considered denying tribal elders vehicle access to a religious site by an administrative road, stating, "Your grandfather didn't have a vehicle, he had to walk." The Chumash elder requesting the access quietly replied, "My grandfather did not need to walk. He lived here." Fortunately, arrangements are now often made to allow elders access to such remote areas.

Recreation values can conflict with traditional religious uses, also. In Bandelier National Monument, a stone formation called the Stone Lions is a significant site to Pueblo Indian people. The Park Service created trails nearby, however, resulting in physical damage and loss of solitude and privacy. The problem was somewhat resolved when the National Park Service subsequently placed cast reproductions of the stone lions in an area more easily accessed by the public.

Critical knowledge is encoded in cultural practices, institutional relationships, and stories.

> Curiously enough, waste and destruction had not always been rampant throughout America. Long before the White man came, certain tribes of Algonquin Indians had learned the wisdom of dividing their tribal hunting grounds into family-size parcels in which none but family members had the right to hunt or fish. These family parcels descended from father to son. In them, the game was kept account of, closed some years for certain kinds of game, and killing was strictly regulated within the

> limits of natural regeneration. Centuries before conservation policy was born, here was conservation practice at its best. The natural resource on which these Indians depended for their very life, as you and I depend on natural resources for ours, was being handled with foresight and intelligence (Pinchot 1947, p. 24-25).

Models for Collaboration in Wildlands

The web of relationships between Tribes and the United States Government provides several collaborative management opportunities. Wilderness will be enriched for the world by further study of several potential models for collaborative wildland management. A few are considered here.

Federal Management; Tribal Consultation—a Chumash Tribal Model: Sacred Spaces and Sacred Species in Central California

Federal management on public lands through the Wilderness Act of 1964 is the most common model of wilderness administration in the United States. About 70 percent of the 2-million-acre Los Padres National Forest is now under wilderness designation. Today, the Forest Service consults with Chumash Tribal Shamans when planning for prescribed burns there.

The Chumash people use lands now within Los Padres National Forest for collecting plant, mineral, and other materials significant to cultural practices. The Forest Service eliminated the requirement for a written permit on this Forest at the request of the Tribe. The Forest Service also complied with the Native American Graves and Repatriation Act by closing a popular public campground that was built on a Chumash cemetery. Chumash youth crews, in turn, removed physical evidence of old campgrounds and other nonconforming facilities in the Wilderness. Tribal members participated in the release of the California Condor, referred to as the Great Thunderbird by the Tribes, now an endangered species, into wilderness areas of the Los Padres National Forest.

Legal Transfer and General Exclusion in Sacred Lands—Legal and Limited Use Model for Sacred Sites

The sacred Blue Lake was returned to the Taos Pueblo by legislation in 1996. Because it is the site of important ceremonies, full Tribal control was necessary to protect sensitive values.

Transfer of Private Lands to the Tribes—Collaborative Adaptation/Purchase Model of the Lummi Tribe

At Arlecho Creek in Washington State, the Lummi Tribe is regaining land through collaborative support from conservation groups, a corporate donor, and cooperation from a large corporation. Over a period of 10 years, members of the Lummi Tribe perfected a plan to make a combined purchase of 2,240 acres. “Arlecho Creek Forest has been a sacred, spiritual place for many generations of Lummi people and now we know future generations will be able to experience this treasure of nature,” said Daryl Hillaire of the Lummi Nation. When the tribe began its efforts, Crown-Pacific Lumber Company had designated it as a premium area for timber harvest. Arlecho Creek, however, provides habitat for endangered species, as well as spiritual values for the Lummi people. The Nature Conservancy now holds a conservation easement on this area, becoming a partner in protecting it for the future.

Land Purchase; Tribal Coalition—Intertribal Wilderness Designation with Multiple Sovereigns and Multiple Values: Strategy for Northern California’s Lost Coast

This model comes out of a coalition of tribes who are organized to purchase land along California’s Lost Coast, adjacent to the State-administered Sinkyone Wilderness Area. The general objective of this coalition is to unite land parcels in the area into wilderness protection units, with restorative practices applied in areas previously damaged by logging and other uses.

Formal Tribal Wilderness Designation—Enhanced Cultural Elements in the Mission Mountains

The 89,000-acre Mission Mountains Tribal Wilderness in Montana is located within the lands of the Salish-Kootenai Indian Reservation in the area once known as the “Place of Encirclement.” It is adjacent to the Mission Mountain Wilderness administered by the USDA Forest Service. Designation and regulation is similar to those areas established under the Wilderness Act. The late Clarence Woodcock, cultural director for the Flathead Reservation, described:

> ...lands where our people walked and lived. Lands and landmarks carved into the minds of our ancestors through coyote stories and actual experiences. Lands, landmarks, trees, mountain tops, crevices that we should look up to with respect.

A special grizzly bear reserve promotes biodiversity values in the Tribal Wilderness. Because tribal governments feel less of the downdraft of congressional winds on their regulations, sovereignty allows closures and limits with greater ease than federal agencies experience. The grizzly bear reserve is of ever more critical importance as Congress is now delaying needed protection of the grizzly bear elsewhere under the Endangered Species Act.

Internalized Respect for Wildland Values—San Carlos Apache Tribe

The reservation of the San Carlos Apache Tribe contains 1.8 million acres in Arizona. Tribal Vice-Chairman Marvin Mull noted that these lands are important to maintaining

the knowledge of how the Apache People are related to wildlife and how to maintain space for various uses. In a recent speech he explained, "The reservation was created in order to contain many different groups of ndeh (the Apache people).... Honoring a heritage of living off the land, we continue to this day to harvest acorns, agave hearts, cactus fruit and jojoba nuts." He outlined the basis for a relationship to wildlands that has worked for centuries:

> We have been successful at this for a variety of reasons. Our grandparents lived in the mountains and canyons of this land. They knew all the different animals that shared the woods and the desert by their Apache names. We were raised speaking our language and learning about the elk and the deer, how we are related to them and how the creator made space for all of us on this world.

The Natural Resource Committee and the Recreation and Wildlife Commission decide on policy issues. Tribal member Paul Nosie implements policy as Director of the Recreation and Wildlife Department under the policy of tribal self-determination. The Tribe sponsors a scholarship/cooperative education program to educate tribal members as resource professionals.

Building wildland recreation opportunities is important to tribal autonomy. A permit may bring in as much as $60,000 for a world-class elk hunt. This economic stimulus can make preservation of forests a reality. The majority of permits are currently reserved for tribal members. Value is placed on the uniqueness of well-preserved lands, distinct from nonreservation lands that are experiencing fast urban growth. The Tribe has classified the bulk of the land as "inoperable for timber harvest." Clearcutting is not acceptable and is rated as both expensive and nonproductive. Multiple species planning is especially important.

Jeanett Cassa of the San Carlos Elders Cultural Advisory Council lays out the underlying philosophy that plant and animal species are viewed as "gifts from the creator," and not "managed resources." In the words of Jeanett Cassa, "The idea we can manage resources is disrespectful. We can only manage ourselves." The northern area of old-growth forest on the reservation around Bear Wallow is viewed as a distinctive, unique area and is called a Wilderness. The Tribal Council has not wanted to place it in formal wilderness designation, however. Concern for rigid, long-term restrictions and impacts led to the choice of practical implementation over formal designation. For now, the multiple councils of the Tribe have relegated long-term care to cultural pride sustained by spiritual use and regard for the native species rather than structured zoning. National Environmental Protection Agency documents guide specific decisionmaking issues.

Some wildland areas are important for youth activities. Traditional "runs" are a source of accomplishment and pride for tribal youth. Such activities are often connected to accessing sacred mountain areas. The University of Arizona continues to restrict access for religious use by these "runners" to Mount Graham in Arizona.

The Tribal Program Manager is working on a 5-year plan to reintroduce fire into the pine forests, woodland and chaparral areas, and grass communities. Basketweavers have noted that burns encourage willow growth, which comes back in longer, straighter branches for weaving. Integrating traditional knowledge is important, as discussed by Jeanett Cassa, who encourages teaching original tribal language to the botanist and in the science classes. Language is a great repository of knowledge about the environment and its relationships with humans for the Apache people.

The San Carlos strategy for their lands rests on tradition combined with professional training and scientific research. Most of all, their wildlands are protected in the hearts of the Apache people. Perhaps this is the strongest protection of all, for it extends to all of the lands.

Cross Boundary Cooperation: Tribal, Federal, and Private Collaboration—the Case for the Wolf and the Future of the Salmon: a Species-Oriented Model for Wildlands

The wolf, nearly eradicated in the United States, has long been a symbol of wilderness. In the Northwest, reluctance from the State of Idaho to accept the role of Project Coordinator for wolf reintroduction, was bypassed when the U.S. Fish and Wildlife Service instead appointed the Nez Perce Tribe. This year, the Mexican Wolf runs free again on National Forest lands in Arizona and New Mexico. Introduction pens were established on the privately owned Ladder Ranch in New Mexico. One wolf has already entered the White Mountain Reservation.

In the Northwest, tribes have the knowledge and technical ability that may forge a collaborative leadership model to save the salmon.

Action Agenda

Collaborative involvement in wildlands protection will come only on terms initiated with the tribes. Reservation lands are often in better condition than surrounding lands, and undue pressure may fall upon tribes for preservation. It must be remembered that these lands are homelands for sustainable living. Sensitivity to cultural, as well as natural, regimes is critical. The practical use of lands extending out from designated Wilderness areas is an important component of wildland protection. The separation of indigenous knowledge from the full ethical and cultural range of understanding and its expression through community institutions will fail to produce collaborative action.

Not all wildland designation need take into account indigenous people—only those we want to be self-sustaining. Only when the human experience can be put back into nature will it be possible to create collaborative preservation strategies that work and that will:

1. Support indigenous people and their sovereign forms of governance that sustain past and present in the environmental continuum.

2. Shape a broader, larger role for American Indian involvement on all federal public lands. Government organizations are downsizing. The knowledge and management ability of tribes, with their professional natural resource departments and culturally based resource knowledge, can be used in restoration projects.

3. Develop and support legislative initiatives and institutional mechanisms that work to assist tribes to achieve sustainable land use, with positive benefits for wildlands.

4. Consider opportunities for tribal management of recreational use that avoid the problems of the market-only approach of commercial concessionaires. Emphasize guided, value-added tours and workshops that promote environmental education and provide American Indian youth with job opportunities using cooperative agreements, the Job Training Act, and other existing authorities.

5. Support legislation and administrative policy actions that return sacred sites and special lands of cultural significance to tribal control in order to maintain cultural and biological distinctiveness.

6. Support treaty rights through working to implement court decisions (such as the Boldt Decision in Washington State) that imply an inherent right to preserve species, waterways, and habitat covered by treaty rights.

7. Support tribally based collaborative efforts with government, private, or corporate entities to establish various forms of land ownership, easements, and tribal regulations to protect wildlands in a sustainable manner.

8. Encourage further research on tribal and indigenous models of land management worldwide as a means to expand sustainable wildland designation and other strategies that include long-term residents and traditional keepers of the wildland treasures.

9. Create educational programs that include indigenous youth in ecology, biology, wildlife, and cultural activities such as provided by the Native American Fish and Wildlife Association.

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Indigenous Natural Resource Management in the Highlands of the Himalayas: Integrated Assessments for Protected Area Design

Camille E. Richard

Abstract—Land management practices were compared between two villages in protected areas (PAs) of the high-altitude, semiarid region of Nepal. Villagers in both areas have adopted indigenous farm, forest, and rangeland management systems that fit within the constraints of the surrounding economic and climatic environment. In one case, however, 10 years of top-down park management have led to heightened conflict between park managers and local residents. In the other, villagers feel neglected and isolated from development programs. This paper highlights the need for proper evaluation of landscapes and their associated agro-ecosystems in the Himalayas before assigning protected area designations, or prior to implementing policies and interventions in ecodevelopment or buffer zones, focusing on a participatory approach to research and planning.

In the Himalayas, there is a growing interest in indigenous natural resource management systems as models for sustainable development and conservation (Brower 1991, 1992; Gilmour and Fisher 1991; Messerschmidt 1990; Rai and Thapa 1993; Tamang 1990). Little attention, however, has been given to comprehensive systems of natural resource management within the Himalayan region's national park and protected areas (PA) network, especially in high altitude, semiarid regions such as found in the Nepalese districts of Dolpa, Mustang, and Manang. These areas are rapidly becoming prime tourist destinations and warrant immediate investigation and planning.

The following case studies depict farm-forest-rangeland-livestock linkages and the socio-economic factors that drive change within an agro-ecosystem in two communities situated within protected areas of the trans-Himalaya of Nepal. Ringmo village in Shey Phoksumdo National Park in the Dolpa District represents a community exposed to a recent influx of tourism and 10 years of park infrastructure activities, as of 1992 (Richard and MacLeod 1994). Nar is located within the restricted Tibetan border zone of the upper Manang District, Annapurna Conservation Area, and to date has not been opened to large-scale foreign visitation (Richard and others 1994). Consequently, at the time of research (summer of 1993), exposure to tourist market forces had been minimal, and the Annapurna Conservation Area Project (ACAP) staff had not established any projects or activities in the area. The two village case studies presented ideal comparisons between an area influenced by park intervention and management, versus an area, until 1993, with little outside intervention other than district government activities.

Discussion

Case Study: Ringmo Village, Shey Phoksumdo National Park

Shey Phoksumdo National Park is unique in Nepal because of its many diverse ecosystems located within the remote rainshadow of the Himalayan range (Gorkhali 1991). The residents in the Park are mainly Tibetan agro-pastoralists who rely on trading activities and park resources for their daily needs (Fisher 1986). There are allegations that human resource use and increasing tourism are having an adverse impact on Park resources (Bajimaya 1990; Sherpa 1990; Yonzon 1990), yet no conclusive studies have been conducted to determine whether resource degradation is indeed occurring.

A rapid appraisal was conducted in the summer of 1992 to identify local resource needs in the village of Ringmo, located in the southern portion of the Park, using the methodology of Messerschmidt (1991). Local systems of resource management were assessed to determine effectiveness within the context of park conservation. Local people's attitudes towards park management, conservation, and tourism were explored. Forest and rangeland conditions were estimated using both qualitative and quantitative methods (production, cover, and shrub density).

Historically, villagers have been managing agriculture, range, and forest land resources in a conservative manner to the extent that they perceive a shortage. Although agriculture is constrained by lack of irrigation facilities and shortage of manure, villagers manipulate available resources in a manner that optimizes production. A tradeoff exists between manure collection and fodder availability. People keep animals in stalls for efficient manure collection, but then must take their animals to high summer pastures where good fodder is available, thus losing that source of manure during the summer months. Considering the environmental constraints, they have optimized the management of manure by two means: (1) planting rotations that optimize the use of manure to favor crops with high nutrient requirements, and (2) applying manure in a manner that enhances its decomposition. Confiscation of agricultural

In: Watson, Alan E.; Aplet, Greg H.; Hendee, John C., comps. 2000. Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management, and allocation, volume II; 1998 October 24–29; Bangalore, India. Proc. RMRS-P-14. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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land by the Park in 1991 has apparently compounded the problems of low overall productivity by reducing total land area.

Villagers manage rangelands using a rotational system based on animal performance indicators, primarily by dung size. Production of palatable vegetation is good, and stocking does not appear to exceed the carrying capacity of local rangeland. Upper elevation summer pastures appear to be minimally grazed and offer good habitat for wild ungulates. Predation is low in this area and is not considered to be a major problem. Winter forage is scarce, the lack of which is a major constraint to livestock production.

In the case of forests, fuel wood resources are readily available except in areas close to human habitation, yet religious restrictions are in place that limit the cutting of green wood for house construction. In contrast, Park regulations completely prohibit the cutting of green wood. Park timber royalty costs for dead wood are prohibitive, and many people resent the presence of outsiders, such as game scouts and army personnel, who impede access to forest resources. Villagers perceive outside intervention as a means to undermine their rights to manage and use forest resources. This situation, in conjunction with land confiscation, has inevitably led to conflict between local people and Park authorities.

Case Study: Nar Village, Annapurna Conservation Area Project

The Manang District possesses great ecological diversity, ranging from lush subtropical forests around Tal in the southeast to high altitude steppe in the northern areas of Nar and Phu (Pohle 1990). An assessment was conducted in the summer of 1993 to document prevailing land-use practices, to identify primary development concerns within the community, and to solicit recommendations for appropriate conservation and development activities in the village of Nar (Richard and others 1994).

The community consists of 61 households of Tibetan descent. The local economy is subsistence based with heavy reliance on local rangelands and forests to meet daily needs (von Furer-Haimendorf 1983). Primary agricultural crops are barley, potatoes, mustard, and hay. Adjacent rangelands are heavily grazed by goats, whose numbers have dramatically increased since the advent of Nepal's Agricultural Development Bank livestock loan program and the influx of government workers in nearby Chame, the district center of Manang. Traditional herds of yak have declined over the past 15 years. Consequently, remote high-altitude pastures remain productive, yet difficult to access. Fuel wood is limited, forcing residents to primarily use yak dung for fuel.

Villagers voiced the greatest concern over livestock health, lack of winter forage, and pasture condition, even though depredation by snow leopard accounted for the highest mortality of domestic animals. In the local perspective, fodder shortages in the winter, coupled with disease, merely exacerbates the depredation problem. Depredation is an accepted part of village life, an attitude that is, in part, due to religious beliefs, enforced by a local lama (priest) who strongly discourages hunting of all wildlife, including predators. Even though hunting still exists in Nar, fewer men are practicing hunting as a profession, and locals claimed that populations of wildlife have increased as a result of social restrictions.

Upper Manang warrants attention by the Annapurna Conservation Area Project (ACAP) because this area represents some of the best known habitat for blue sheep and snow leopard, and boasts some of the highest recorded populations (Sherpa and Oli 1988). Rangeland conservation management in the form of ecotourism development and a multi-use management zone designation has great potential to increase livelihoods and promote conservation awareness, building upon local organizational capacity and culture. The local community intrinsically recognized that declining rangeland condition and access are the major constraints to livestock development and was eager to have more involvement in ACAP activities.

An Agro-Ecosystem Approach to Protected Area Designation and Management

The conservation of natural areas is completely dependent upon local people's dedication and support (Jefferies 1982; Schaller 1977; Upreti 1991), an unachievable goal without an understanding of local land-use patterns and the socio-economic factors that influence indigenous management rationale. A well designed assessment program would need to shed insight into the complexities of indigenous land management systems and the manner in which outside intervention positively or negatively alters the ebb of village life, especially local institutional authority. Conflicts arise between local people and park authorities because protected area designations and policies are often formulated and implemented before the environmental and socio-economic realities of the area are understood and appreciated.

Protected area managers must adopt an agro-ecosystem framework for analysis when addressing conservation issues in countries such as Nepal where humans reside within or use protected area resources. This information is vital to effectively designate a protected area, or to devise realistic strategies for ecodevelopment and buffer-zone management. This is because the environment dictates the potential for land-use intensification in associated farming systems (barring socio-economic constraints for the sake of simplification in this discussion).

Figure 1 shows the relationship between agro-ecosystems and their potential for intensification (the basis for buffer-zone management, given the objective to reduce pressure on neighboring protected areas), and the ecological basis by which the gradients are designed. Grimes (1979) has provided plant ecologists a simplistic but often applicable model to conceptualize plant species and their adaptability to various types of environments, termed "life history strategies." In resource-rich habitats (those characterized by low stress, such as drought or nutrient stress, and low disturbance, such as fire or other activities that remove plant biomass), plant communities are dominated by fast-growing "competitive (C)" species. When these habitats are disturbed, fast-growing, nitrophilous "ruderal (R)" species assume dominance. In resource-poor environments, those characterized by high stress, such as aridity or cold temperatures, plant communities are dominated by "stress-tolerant (S)"

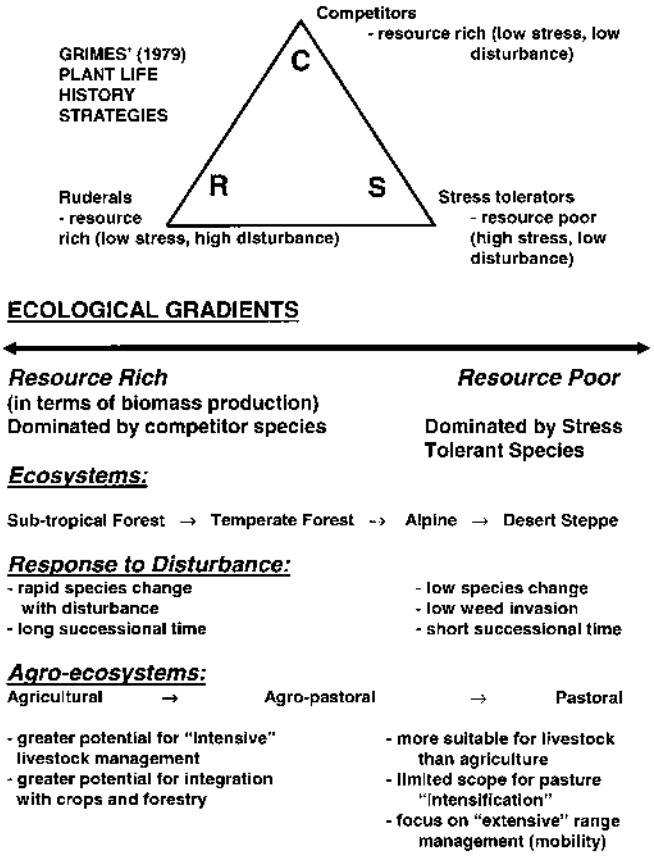

Figure 1—The relationship between agro-ecosystems and their potential for intensification.

species that are naturally low in productivity. These life history strategies, like the farming systems prevalent in each ecosystem, reflect the environmental conditions under which they evolved.

If one looks at the Himalayas in terms of an environmental gradient, for example, a cross-section of Nepal from south to north, one moves from resource-rich subtropical forests at low elevation in the Gangetic Plains up to the High Himalayas and onto the Tibetan Plateau, characterized by alpine meadow and alpine desert steppe, respectively. The associated farming systems change with this gradient as well, from crop-based agricultural communities in subtropical climes to nomadic pastoral communities on the high elevation Tibetan Plateau. In between are semi-sedentary agro-pastoral communities at high elevation where cropping is limited to a short growing season in the warm summer months, during which time livestock are taken to remote alpine pastures.

General socio-economic and policy trends are also observed with this ecological gradient as landscapes become more marginal:

- The relative importance of livestock increases in the local subsistence economy as cropping options decline.
- Little policy recognition is given to the importance of livestock in subsistence livelihoods, particularly in mountain agriculture as a "technology" to maintain soil fertility, given that livestock are the most efficient at converting crop waste into compost, especially at high elevation. Thus, policy focus tends to be on mono-production systems rather than integration among agro-ecosystem components.
- Such policies that are primarily focused on improved agriculture, improved livestock breeds, or pasture development become increasingly inappropriate in high-elevation areas, given the environmental and socio-economic constraints (low productivity, remoteness, and poor access to markets).
- As recognition of the low potential of these areas becomes more prevalent, policymakers increasingly ignore these areas.
- Many of these high-elevation areas have become national parks and wildlife sanctuaries due to their remoteness and relatively pristine nature, but the approach is often based on lower elevation models, where human access has been more (and is capable of being) restricted. Restricted access to resources has thus marginalized mountain communities who find themselves with few livelihood options, compared to lowland groups.

Implications for Buffer Zone Designation and Management

The primary goal in buffer zone management is to intensify land use in areas surrounding a core protected region, thereby reducing pressure on protected area resources, raising the living standards of local residents, and increasing local interest in conservation. However, the prevailing environment affects the potential to intensify livestock or agricultural output. This needs to be taken into consideration when developing plans for buffer zones, or even designating them in the first place. For example, in subtropical regions, the potential for intensified livestock management and its integration with cropping and forestry activities is greater than in high-elevation areas, where the emphasis should be more on extensive livestock movements, thereby maintaining mobility of herds and rangeland condition. Thus, at lower elevation, true core areas can be designated that exclude human use, with well-differentiated buffer or ecodevelopment areas that effectively diversify land-use options. At high elevation, livestock must be mobile and have access to remote pasturage, which often occurs in core protected areas. Here, the option to exclude human use of natural resources is limited, given the need for remote access in such marginal environments. Thus, clearly defining a "buffer zone" characterized by intensive use versus a "core area" that ideally has no human resource use becomes a more difficult, if not impossible, task.

Implications for Wilderness Designation

This ecological gradient can be related to a gradient of "wildness" as proposed by Aplet and others (in press). For areas of the world that do not have the luxury of true "wilderness" based on the Western ideal (excluding human use other than for recreation and research), then perhaps a new definition could be devised. This definition would

differentiate "nonwilderness" from "wilderness" as those areas with intensive land use such as croplands, artificial pasturage and haymeadows, woodlots and fenced rangeland, and areas with limited extensive land-use activities such as ephemeral nomadic camps and grazing areas, and nontimber forest product extraction, provided that a "natural" or "wild" character is still maintained (fig. 2).

Conclusions

Two general options currently exist for protected area designation in the high-elevation areas of the Himalayas:

1. To settle access rights through creation of a human-free zone (Strict Nature Reserve or Core Area). The implications and recommendations are:

- Such an approach potentially eliminates subsistence-based activities such as animal husbandry and agriculture for resident communities.
- Compensation must match the subsistence and cash value of livestock and crop loss (in terms of pure asset, food, meat, soil fertility, and cash income from agricultural products). Otherwise,severe conflict is most likely to ensue.
- In addition to compensation, provide alternative income opportunities through ecodevelopment/buffer-zone activities, if possible (these "alternatives" would be dictated by the ecological and socio-economic environment and are more limited in high-elevation areas).

2. Designate multi-use zones within protected areas (for instance, allow extensive activities such as grazing in managed core areas). The implications and recommendations are:

- Implement participatory research and management by capitalizing on indigenous knowledge and legitimizing local institutions, thereby harnessing the support of the people who are perceived to be the greatest enemy to conservation. In pure utilitarian terms, protected area managers do not have the human resources to protect these areas. Why not get the local people to do it?
- Such an approach will increase the potential for success of eco-development and buffer-zone activities so that over time, human reliance on protected area resources are reduced (not necessarily eliminated).

Before appropriate protected area designations can be made, managers should attempt to clarify the following, using participatory research and planning methods:

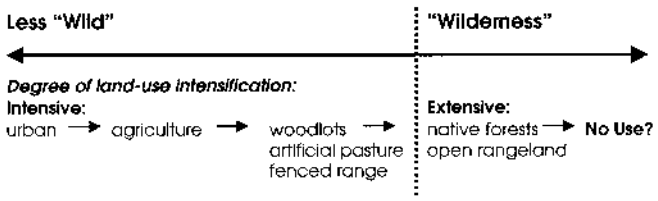

Figure 2—Gradient of " wildness" (adapted from Aplet and others, in press).

- To identify critical habitat for key plant and animal species with data in a geo-referenced format.
- To identify patterns of human use (including indigenous management systems and their rationale) within a proposed protected zone, with data also in a geo-referenced format.
- To determine whether human use (such as grazing) actually threatens biodiversity elements.
- To understand the degree of dependence by local communities on protected area resources within the context of the prevailing agro-ecosystem;
- To investigate the degree of socio-economic impact with potential severance of use rights.
- To mutually identify constraints and to prioritize conservation and development needs as perceived by both the local communities and protected area managers.
- To identify realistic alternatives that can improve income and lessen dependence, keeping in mind the realities of the ecological and socio-economic environment, rather than restricting rights from the outset of protected area planning.

The role of parks as sole protectors of biodiversity is ineffective if not combined with sound development policies that appreciate and enhance indigenous systems of resource management. Parks must facilitate appropriate community development if local participation in conservation activities is to be achieved. Information from these studies can aid in the formulation of future protected area management plans by recognizing local resource needs and knowledge, and by incorporating local perspectives into the planning process. This can only be achieved, however, by legitimizing local resource users through effective communication, and with tighter coordination among government ministries, nongovernmental organizations, and other stakeholders such as trekking agencies.

As tourism rapidly changes the cultural backdrop of these communities, villagers will adjust their activities to exploit new market opportunities. Whether these changes are sustainable is yet to be seen, but without a working partnership among communities and protected area managers, chances for sustainable tourism development and effective biodiversity conservation are unlikely.

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Wilderness Thoughts from the Traditional Lore of India: Of Concern to Peace, Healing, and Pleasure

M. A. S. Rajan

Abstract—Wilderness can be the origin of human values. Wilderness projects an image. In citing some ideas and excerpts of traditional Indian lore, two very different images are depicted—wild nature as a setting for pleasures of the body, and wilderness as a source of peace and spirituality. What are the benefits that a wilderness area can provide to humankind? Some are indirect benefits, which accrue even while leaving the land absolutely untouched. Others accrue by direct, and let us say benign and limited, utilization of the natural endowments of the land. Among various direct uses is the use of wilderness as an aid for the personal growth of, and therapy and education for, human beings.

For the present purpose, we have to take it that the wilderness is already there; whatever may be its origin, good or bad, natural or man-made. As a personal choice without the backing of desk research, I would define wilderness as a given land area that is protected from, or is naturally free from, the depredations of human beings, and supports only that population of life forms, including human beings, which is able to live in self-sufficient synergy and harmony with the land. Clearly there is imperative need to be specific about what it is that we wish to extract from such a wilderness, as a benefit to human beings going there for personal growth or education, before we disturb or destroy this harmony.

Omar Khayyam

It is relevant to recite a celebrated Persian poem here. Wilderness occurs in a stanza of the poetic work "Rubaiyat" by Omar Khayyam. It went like this (in the translation by Edward Fitzgerald):

> Here with a loaf of bread beneath the bough,
> A flask of wine, a book of verse - and thou
> Beside me singing in the wilderness -
> And wilderness is paradise enow.

Omar Khayyam was a Persian intellectual of the Sufi sect of Islam. He is recognized throughout the East as a mystic. He was not a hedonist, but his mysticism was warmly human. To quote a comment of a celebrated Yogic philosopher on the "Rubaiyat" (Yogananda 1996), the poetry of Persia often has two meanings—one inner and one outer. The "Rubaiyat" is, on the face of it, a worldly, even profligate love poem, one written in celebration of earthly pleasures, but in the style of the Sufi mystics, it carries a deep spiritual allegory.

The Yogic philosopher has viewed the hidden meaning of the "Rubaiyat" through the prism of Vedanta. According to him, wilderness in this quatrain implies the temporary sense of loss that often precedes true fulfillment. Life then, at first, may seem a "wilderness" devoid of any herbage of hope. With the aid of bread, wine, the leafy shade of tree, book of verse, and the singing of the beloved, the inner void appears clothed with wildflowers of celestial joy. Bread here connotes the life force or energy of the body. Wine is god intoxication, and the bough or tree is the seat of the soul. Book of verse is the inspiration emanating from the heart once it has calmed its restlessness. In Sufi mystical teachings, to depict a soul that is filled with infinite love of God, divinity is given a female form and described as the beloved of the soul.

Wilderness for the mystic and for the spiritually inclined is desolation, but a window through which inner happiness can be attained. But the idea that it can be a base or the home for a sensual paradise on earth, a palace for hedonism and the pursuit of physical pleasure would be for them sheer anathema.

The dictionary gives to the concept of wilderness a tinge of desolation and distress. When we begin to use a territory that is devoid of habitation and human presence as a substrate for some human benefit, what happens to it? That depends on which one of two readings of Omar Khayyam we choose. One is the wilderness evoked by a literal reading of the "Rubaiyat." The other is the allegorical view of wilderness seen through the prism of Vedanta. If our choice is the former, the territory will cease to exist as a wilderness.

Shuka-Rambha Dialogue

An old Sanskrit work comes to mind (Manuscript [n.d.]). This is a poem well known among students and connoisseurs but little known elsewhere. It is skillful poetry, full of prosodic artifice, and interestingly it mentions several forest plants and products. The imagined scene is set in the middle of the forest. Rambha, the temptress from Heaven, and Shuka, the revered sage, are engaged in a duel of words. She has been sent down to earth by the powers in Heaven expressly to subvert the sage's penance, and she presents her wares by holding forth on the attractions of woman. He

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counters by extolling the beauty, the power, and the munificence of the Divinity. A feature of the repeating refrain in the poem is that both sage and siren use the identical lament! "Oh, how futile it is for man to come to this forest if...."

The temptress describes the sights and sounds of the sylvan surroundings, like the cooing of cuckoos and the fishlike eyes flashing desire through moonlit creepers, as invitations to amorous couplings—PR of the God of Love. The sage describes groups of the devout chanting hymns along the jungle paths, bathing in the holy streams of the surroundings, and holding discourses on the scriptures as the instrumentality to let the love of the Divinity enter one's heart. (Is one permitted to juxtapose these groups with wilderness trekkers of today?)

Rambha then recites stanzas extolling the endowments of a variety of amorous damsels, and, stanza after stanza, Shuka-muni counters with a panegyric on the glories of God. Says Rambha, a damsel in the forest, "...aroused with desire, with a face like the full moon, lips like the bimba fruit, and a delightful voice ...sweet of speech, waist adorned with a girdle of golden champak flowers, skilled in the art of love...lovely, kind, with erect breast anointed with sandal, desire-filled eyes..." (and so on in the same vein); who is not "...tightly clasped, closely embraced, shoulder to shoulder...kissed on her pretty belly button...," (etc.) by the man coming into the forest; such man's life is verily a waste.

Shuka-muni is an enlightened soul who is able to witness the Divinity in anything and everything that he sees. Responding to Rambha stanza for stanza, he says to observe the images, visages, and glories of the Divinity; the man who seeing the forest cannot visualize them and "in his heart grasp his love for the Divinity even for an instant... intensely pray to the Divinity at the moment of enlightenment...cherish the Divinity in his mind when in meditation or penance...," that man's life, exhorts the sage, has passed away wastefully.

Rambha persists in her line and the dialogue goes on bitterly. How did it end? Legend, rather than the poem, has it that the temptress failed, and the effort to thwart the sage was foiled.

In a way, the poem depicts two extremes. The wilderness can be a tantalizing invitation to sensual enjoyment. It can also be the means of sublimating your feelings and moving your thoughts towards the Divinity. It is all in the mind.

When we turn to the traditional texts of Sanskrit belonging to the Vedanta tradition, we perceive an approach to wild lands that is not purely homocentric. Deep jungles, high mountains, and the like are typically the spaces in which sages and seers chose to set up their tiny habitations. The sages who desired such spaces were typically savants on a quest for inner peace and greater knowledge of the inner self. There are several passages and texts in old Sanskrit literature that describe the qualities and requirements to be met by these hermitages. The specifications, essentially, were tailored to support and enrich the spiritual effort. For example, places conducive to Dhyana Yoga that is meditation, it is said, should be on plain ground free from stones, sand, and fire, and above all should be pure and sacred, stimulating placidity of the mind without disturbing or agitating it.

Natural endowments like rivers, hills and their caves, the seas and their coasts, were taken as visible manifestations of the power that created the Universe and thus were objects to be venerated. They were given the aura of sacredness as places of pilgrimage, and the act of going to them became an important religious practice. The nature of pilgrimage was Prayaschitta, a religious act to atone for sin. A person who goes on pilgrimage with purity of mind, leaving behind his sinful acts and worldly attachments, is relieved of sin, it was said. In some instances the groves were given an extraordinary sacredness. For instance, one legendary forest was worshipped as a Deity itself, as the Creator was believed to have taken abode there. The place was given a name symbolizing the lotus wherefrom the Creator himself arose. Likewise, prominent, uninhabited hills were imbued with personalities and divine powers.

Even trees in the forests were similarly bestowed with holiness. There are chapters in the Puranas that say how each particular tree is associated principally with a Deity, and give the legendary basis for that belief. The most prominent of these legends naturally refers to the principal deities in the Pantheon, namely Shiva and Vishnu. The Vata tree is regarded as the symbol of Shiva, and the Asvattha tree that of Vishnu. To this day, sacred rituals echoing the ancient legends are performed around these trees.

In the tradition of the Puranas, trees have been imputed with personalities. Trees singly or in a grove in the forest have been said to be able to perform good deeds in support of good people. In one place in the Ramayana, a grove of trees surrounding a hermitage was implored to provide protection and safety to the heroine who had to be left all alone there.

In short, forests, mountains, caves, seas, and such are seen as entities with an organic relationship with human beings, typically as objects of reverence and worship, treating them as places that are manifestations of the Creator. Their common base and foundation is the Earth, and the Vedantic tradition was especially reverential toward it.

A morning prayer recited on rising from bed says this:

> O, Mother Earth, adorned by the garb of ocean, with mountains as your breasts, bear with me as I place my feet on you.

The injunction in the Upanishads is for Man to regard himself as subservient to the system—not its master. From this was derived the principle of non-accumulation; Man must take from Nature what he needs, not less or more, but shall desist from hoarding to satisfy his greed or gain advantage over Nature. The mental construct about a territory and its endowments is akin to a helper, a protector, and a cleanser of sins. The image is touched with not sadness or desolation, but with spirituality, even if that is at the level of symbol worship.

Food for Thought

One can conceive of an array of different Nature-endowed components of wilderness as forming inputs, and many varieties of "benefits" from each such component constitute the possible outputs. We could thus describe an input-output framework with many kinds of inputs and many kinds of desired outputs. A particular set of desired outputs help define wilderness.

What is a desired output? We know what it would be if one left it to the temptress or to the sage. A selection has to be

made for this modern day and age. Each choice can be linked to an element, or elements, of the wilderness's natural endowments.

Incidentally, what does one do when particular desired outputs fail to mesh with any input from the natural endowments of the given wilderness? It depends on one's readiness or reluctance to disturb Nature. Typically, available endowments are altered or manipulated to generate the required inputs, or the inputs are brought in from outside. Land use in such cases corrupts wilderness.

Finally, what can one make out from this look at one fragment of the traditional lore? Wilderness, or Nature in the wild, needs to be treated as a sentient rather than nonsentient entity, one that is organically related to Man; and is to be taken as helper, a protector, a cleanser of sins. As a manifestation of the Creator in its (nearly) pristine state, an approach marked by respect and restraint would be in order. One has perforce to recognize that the mode of usage of wilderness, concretized as a bundle of desired outputs, should focus on the mind of the user rather than the user's bodily wants. In this view, it would be appropriate if the modalities of usage are suffused with other-worldliness, and desirable indeed if gross physical land use is altogether avoided.

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IV. Wilderness for Personal Growth Symposium

Congress delegates visited historical and cultural sites as well as natural areas on post Congress tours (photo by Alan Watson).

Congressional delegates of all ages enjoyed lively discussions about the benefits of wilderness (photo by Alan Watson).

Wilderness Education in the Adirondack Park: A Case Study of the Huntington Outdoor Education Center

Robert Buerger
Thomas Pasquarello

Abstract— For over 100 years the Adirondack Park has served as an example of how wilderness protection and human activity can coexist. Located in northern New York State (U.S.A., this 6 million acre (2.4 million hectare) park is a combination of public and private lands, which includes nearly 130,000 people who live and work within the park boundaries. Much of the Adirondack Park's public land is protected as "Forever Wild." This paper presents a case study of the State University of New York, College at Cortland's Huntington Outdoor Education Center, and its role in Adirondack Park wilderness education.

"The lands of the state, now owned or hereafter acquired, constituting the forest preserve, as now fixed by law, shall be forever kept as wild forest lands. They shall not be leased, sold, or exchanged, nor shall the timber thereon be sold, removed or destroyed." (Article VII on the New York State Constitution as approved by the Constitutional Convention of 1894.)

For over 100 years, Adirondack Park has served as a unique experiment where wilderness protection and human activity coexist. Located in northern New York State (U.S.A.), this 6 million acre (2.4 million hectare) park is a unique mix of public and private lands. The 2.4 million acres (960,000 hectares) of public lands known as the forest preserve are protected by the State Constitution as a permanent wilderness resource and managed as such for the benefit of the citizens of New York. The other 3.6 million acres (1.44 million hectares) of parkland are privately owned. Approximately 130,000 people live and work full time within the park boundaries. This unique combination of public and private lands makes Adirondack Park a model of a "living wilderness," where protected natural resources are meshed with sustainable working landscapes. This, in contrast to the more traditional United States method of complete government ownership of protected landscapes, provides another model for wilderness management. As such, the lessons learned through the Adirondack Park's long history serves as an example on how to integrate people and wilderness.

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Physical and Human Resources of the Adirondack Park

The size of Adirondack Park alone makes the area unique. The Park's 6 million acres represents a fifth of the total land area of New York State. In comparison, the Park is three times larger than Yellowstone National Park or the equivalent size of the entire state of New Hampshire. Within the Park there are 2,500 lakes and ponds, 1,200 miles of wild rivers, 30,000 miles of brooks and streams, and 42 mountains over 4,000 feet in elevation. Biologically, the Park is a haven for plants and animals. The Park contains one-half million acres of eastern old-growth forest. Ninety percent of all animal species that inhabit the eastern section of the United States can be found during some period of the year in the Adirondack region. The combination of these physical and biological factors makes the Park a unique reservoir of biological wealth (Schneider 1997).

The human dimensions associated with the Park are also noteworthy. Sixty million people live within a 1-day drive of the Park. Ten million people visit the Park each year and a quarter of a million people live within the Park either year round or seasonally. The long history of this unique mix of protected wild landscapes and integrated human use has not come without controversy. Periodically through its history the purpose of the Adirondack Park has been debated, especially by those most closely impacted by the Park—its residents. During the past decade, the value of the Park has once again been contested. The current debate pits those who see the Park as a model of sustainable development, where people and wilderness coexist, against those who see the Park as an overregulated government intrusion into the rights of private citizens to utilize the resources of the region in which they live.

Adirondack Park Problems and Potentials

Past research by the authors (Buerger and Pasquarello 1992, 1994) has identified three areas that must be addressed to resolve the current public debate regarding the future of the Park:

1. Park management must improve the opportunity for public participation in decisions concerning the future of the Park.

2. Park management must assist in creating sustainable economic development on private lands in the Park.

3. There must be an effort to increase public education and awareness about Adirondack Park.

It is the third area, public education, that holds promise for improving public consensus regarding the value of Adirondack Park. Ultimately it is the public, especially the park residents, who will determine the level of stewardship afforded the Park. In a 1991 survey of Adirondack Park residents, the authors found a surprisingly large number of subjects who did not know important information about how the Park was managed (Buerger and Pasquarello 1994). As an example, only 43 percent of the sampled residents knew that the public forest preserve lands within the Park are protected by the New York State Constitution. Similarly, only 43 percent of the sample knew what State agency was responsible for managing the public forest preserve lands in the Adirondack Park. This lack of knowledge displayed by residents about the unique features that identify Adirondack Park may increase the likelihood of user conflict, environmental degradation, and a lost sense of park identity in the near future. As such, the authors have recommended that some educational mechanism needs to be identified that will help the public increase their understanding about Adirondack Park and its multitude of benefits to the people of the State of New York, especially to the Park residents. The goal would be to have those people who are most directly impacted by the Park become its primary stewards (Pasquarello and others 1994).

Huntington Outdoor Education Center History

Since 1948, the State University of New York, College at Cortland's Huntington Outdoor Education Center (HOEC), has provided thousands of people with their first exposure to the wilderness environment. Through HOEC programs, college and high school students, decisionmakers, and the general public have gained a greater understanding and appreciation of Adirondack Park through environmental education and outdoor skill development. Located in the heart of Adirondack Park, HOEC was originally the summer estate of Southern Pacific Railroad magnate Collis P. Huntington. The property has been described as the first of the great Adirondack camps and where the Adirondack style of rustic architecture began (Gonino 1974). The historical significance of HOEC is reflected in its listing on both the State and National Registry of Historic Sites. In 1948, the property (204 acres) was donated by the Huntington family to the State University of New York (SUNY) College at Cortland for the purpose of establishing an outdoor education center. The HOEC has since grown to 424 acres with facilities to host 133 resident program participants.

Huntington Outdoor Education Center Today

The Huntington Outdoor Education Center serves as a focal point for environmental and outdoor education programs at SUNY Cortland. The main objectives of the Center are:

1. To develop an appreciation of natural resources in all program participants.
2. To provide program participants with an understanding of ecological relationships, environmental concerns, and human needs.
3. To provide program participants with the knowledge to make informed environmental decisions.

In 1997, HOEC hosted 60 programs serving over 1,800 participants, resulting in 310 program days. Approximately 55 percent of these programs were university classes where course credit was earned. As an example, the Physical Education and the Recreation and Leisure Studies Departments require their majors to complete a 2-week outdoor education practicum at the Center. Both feature 5-day canoeing and backpacking trips through the surrounding Adirondack Wilderness. There are also elective courses offered at the Center for both graduate and undergraduate credit, including: Adirondack Winter Studies, Biodiversity and Environmental Policy, Adirondack Park Policies and Issues, Teacher Education Workshop in Conservation, Adventure Programming, and Mycology. Other credit-bearing courses offered at the main campus use HOEC for weekend field trips, practicum, and internship experience. About 20 percent of the 1997 HOEC schedule was noncredit education programs. These programs were predominately faculty or student workshops and retreats, which were sponsored by academic departments. Another 20 percent of the schedule was devoted to nonuniversity-sponsored outdoor education programs, with the remaining 5 percent of the schedule focused on various administrative workshops.

The Future of Huntington Outdoor Education Center

In the near future, SUNY Cortland will undertake major initiatives designed to increase the number and types of programs offered at HOEC using distance learning technology. As an example, there is currently a proposal to develop new outdoor education programs that would link HOEC with the SUNY Cortland main campus, and educational sites located in the Adirondack region, including the Adirondack Museum, the Long Lake School District, and the Hamilton County Board of Cooperative Educational Services. Such initiatives would help HOEC move toward more active programming to include local park residents and visitors.

Developing a sense of stewardship by park residents is critical for the future of the Adirondack Park. In this context, stewardship refers to an informed sense of responsibility that will help mitigate the economic, social, and political conflicts that have characterized the Adirondack Park throughout its history. In a broader sense, true stewardship goes beyond solely the Park residents, but also must include New York State residents and Park visitors. As such, all three populations will be targeted for future HOEC educational programs.

One approach being considered for improving education about Adirondack Park is through the integration of subject information into public school curriculum. This may be the most effective way to reach both park residents and other New York State residents (who, not surprisingly, make up a

large percentage of Adirondack Park visitors). A curriculum that provides instruction on Adirondack Park's human and natural history and examines current Park policies and issues could be developed and implemented in schools located in or near the Park, and a shorter but similar unit could be developed for schools in the rest of New York. Given its historical significance and beautiful natural setting, and the fact that SUNY Cortland has New York's largest university education department, the Outdoor Education Center at Raquette Lake would be the perfect venue to develop these curricula. The Center also provides an ideal setting to bring together groups and individuals that represent the diverse, passionate, and often contentious viewpoints that characterize Adirondack Park politics for a frank discussion of the issues that divide (or sometimes unite) them. Participants could include park residents, public school teachers, interest groups, park managers, and elected officials.

For over 100 years, Adirondack Park has attempted to manage public wilderness resources and private lands on a large scale where both the protection of ecosystem integrity and biodiversity, and the quality of life of the region's residents are protected. In the twenty-first century, the Park will face new challenges and threats. SUNY Cortland's Huntington Outdoor Education Center would seem well situated to take on the role as the leader in education related to Adirondack Park. Such leadership will be essential to the continued success of this grand experiment.

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The Relevance of Real Experiences in the Development of Young People and the Quantification of Their Personal Gains

Derek T. Jackson

Abstract—Within the United Kingdom the author has experienced practical difficulty in dealing with the general enquirer's understanding of the rationale and justification for experiential education and how it relates to the developmental needs of young people. This is within the context of growing up in today's society and acquiring the skills needed to earn a living and to be successful in getting and holding down a job in a highly competitive environment. There is also a need to set out arguments for educators, employers, and potential funders/sponsors as to why they should support outdoor or adventure education in terms of time, funds, and resources.

This paper addresses the questions of increased use by environmentalists and outdoor enthusiasts, and of the terms "wilderness" and "wilderness education." To those outside this field, the word "wilderness" often holds a negative connotation more synonymous with emptiness, low value, the preserve of individuals driven more by emotion than practical understanding, lacking economic relevance, and suitable only for demanding recreational and holiday purposes. It is also felt that for many it is not seen to be a word that suggests value.

These issues are addressed in a non-tendentious way through concentrating on the here and now and the practical. It focuses on the young person at school in a changing society where the days of unchallenged social values, the family, and development of children through outdoor play and interaction with others involving first-hand experiences is diminishing.

Over the last three decades, life in all aspects has changed immeasurably. It is arguable that childhood, the play, and experiences my generation enjoyed have disappeared. Childhood is fast disappearing. Children have almost become an endangered species. Nowhere is this more evident than in the world of recreation, fashion, pop, and the media. Children become superficially adult overnight as opposed to "precocious" as adults used to say. "Precocious" is a word now seldom heard.

Children

As soon as children can hit a switch (or batteries), in my experience as young as four, they can tap into the explicitness of the adult world. Nowhere is this more evident than in the publication of the children's version of the Starr/Clinton report, which simply gave rise to more enquiries. Children are thus long in knowledge but very short on experience to handle that knowledge, much of it gathered secondhand from electronic imagery and databases.

As an example, a recent survey in the United Kingdom showed that the average British child watches TV/videos for 22 hours per week, largely a passive activity even when shared. This means 23,000 hours of viewing by the age of 17, as opposed to 21,000 hours of schooling where it is estimated that teachers will be speaking for over 60 percent of the time.

Many other life experiences are secondhand, derived indoors in an increasingly urbanized world where parents are fearful of children out of sight, at play, or isolated on upper floors of flats or apartment blocks. While children can interact indoors sharing what they do, it is generally one-to-one with a best friend who can often be someone else's best friend! This is in stark contrast to the instant and compelling feedback from activities in the outdoors and what this conference refers to as the wilderness. Indoors they rarely have to come to terms with interpersonal factors such as cooperation, communication, and working together to make things work. They can withdraw to their bedroom, to their earphones or screen, and blank the problem out, never dealing with the real issues.

Bridging the Gap

There is a need to bridge the gap between contemporary life and formal learning to enhance the personal capabilities of young people and to help balance their lives. This is in a way that cannot easily be achieved in the classroom or at home with its varied and sometimes isolated patterns of living, so aiding their progress through life.

Home, the classroom, and secondhand experiences are not sufficiently conducive to gaining emotional literacy, particularly where both parents work and are under pressure to progress their careers, or with the confusion of divorce, now running at over 33 percent in Britain.

To me there is an absence of balance in learning to handle events and emotions in a world of short attention spans and cliches like "Whack My Soul." The need is to balance the yin and the yang through experiences that can combine achievement, catching the imagination, pleasure, handling the

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routine, and overcoming the apprehension that invariably surrounds the unknown, with life; life as it is really lived—a truly holistic approach.

A few years ago, I saw a piece of truly thought-provoking graffiti, particularly because it was on the wall of a 19th century factory, now redundant and formerly used by a multi-national company to produce synthetic fibers (but temporarily in use as a training center for the young unemployed in its catchment area, a clear indicator of change). At that time, local unemployment rates were around 73 percent for those under 23. The reason why this has reduced very considerably is complex but largely due to a higher take-up in further and higher education through incentives that are politically inspired, but nevertheless of merit. However, this merely extends the time spent in the class or lecture room.

Also, if you are unemployed and living on government or someone else's money, you tend to treat it as free income over which you have little control. Thus the state tends to replace the parent and learning through the realities of the workplace. Adolescence is extended with all the disadvantages to the maturing process.

The graffiti said, "If Education is for Life: How come I didn't do it at School?" In short, I've left school without the skills to get through life—how do I cope? It begs the questions, "Where do I get these skills?" "How do I learn to apply knowledge, make things happen, and earn a living?" "Where are my three "R's?"

The Three "R's"

The Three "R's" stand for Reading, Wrighting (wheelwright, arkwright, shipwright, etc.), and Reckoning. They are not the oft quoted and corrupted three R's of academia—reading, writing and 'rithmatic, which can be interpreted as knowledge for knowledge's sake. They are:

- How to read an instruction.
- How to make something from it.
- How to calculate size, strength, weight, flotation, stability, etc.

In short, how to make things happen, apply knowledge, make things, and earn a living. These principles were originally included in the indentures of apprentices until the turn of the 19th century.

I recognize that there are enormous shifts in schools through project work to provide a more practical education, but this still involves class-based work of gathering practical information and its theoretical or modeled application. It does not necessarily develop personal skills.

One way of achieving this is through an outdoor, or possibly expedition, experience over an extended timeframe where the individual finds it difficult to opt out of what is going on. However, this requires a light-handed approach and high-quality staff. In some ways, an expedition is similar to going to war in terms of accelerated growth for those involved.

An expedition evokes the same emotions and similar challenges as war, but without gunfire and death. It has all those ingredients that move the 18 or 19 year young man to adulthood overnight. With an outdoor experience, fear, an essential ingredient in concentrating the mind, is replaced by apprehension, and happily includes young women to mirror the reality of life. Feedback and (self) analysis of personal performance as opposed to finding yourself alive or dead further enhance this! What then are the needs to be met?

The Need

The need is to offer a range of firsthand experiences. This has to be in a form that enables personal growth to be measured and quantified, and that provides feedback relevant to the needs of individuals and in a form that is understandable.

But what is the best way to balance formal learning, create new life experiences, and learn how to manage them? To me, it is very much in the outdoors, if you like, in the wilderness—a classroom without boundaries and predictability (but it is not a church or shrine at which to worship nature—again the "whack my soul" approach). However, it is clearly an environment to be in and in awe of nature. But—and it's a big BUT—the mountains and wilderness do not have a voice. They need someone to interpret the outcomes and benefits from being among them. These can be summarized as:

- Evident emotions and reactions to real situations through experiencing pleasure, success, or falling short.
- Turning failure into success from seemingly no second chance.
- No escaping the issues by not being able to withdraw from events.
- Having to live with the outcomes—good or bad.
- Discomfort and having to handle consequences of the unavoidable and don't likes.
- Self-discovery from seeing the effect of individual input and behavior on events and others.

What does all this add up to? Individuals welcome being stretched (stretched but not torn) emotionally and physically. There is a need to pace activities to ensure that people are not taken out of their depth. This is to avoid individual energies and emotions being focused solely on personal survival, thus preventing reflection, enjoyment, and having time to support the needs of others. The outdoors is not some moral gymnasium; to make it work it needs some magic ingredients:

- Fun
- High activity
- Excitement
- Apprehension, not fear
- Stretched but not torn

These ingredients replace the common perception of an unrealistic struggle against nature, which can be summed up in a slogan on a t-shirt I once saw: " I faced the ecosystem and survived." What needs to be fostered is the attitude "relax and melt into it to enable discoveries to be made." John Ridgeway, the first to row the Atlantic, when interviewed by BBC World Service, was asked, "What's it like to have beaten the Atlantic?" His response: "We didn't—it left us alone."

The key to all this is the facilitator and the person who evaluates the events and outcomes. I will return to this point.

For me, the outdoors is rather like a databank of memories—memories of how we handled things in the past. As an example of this, ask the question, "Do individuals have enough experience to handle the skids of life?" Let's look at a skid in a car. Ask a man if he can control a skid and the answer will be yes. But ask him how many times he has skidded and the answer is likely to be "never." A real man never skids! Ask a woman and she is likely to ask you what you mean; "I don't know—I've never had one" is often the reply. If you have skidded, you are unlikely to forget; every sense comes alive. With an outdoor program, you can arrange the number and nature of skids to suit the learning objectives.

I believe the databank of memories (or skids) in our heads is akin to an on-board computer. For example, the service engineers at the main IBM service station in the United Kingdom have 30 minutes to fix an onsite problem. If they can't, they call in and ask the central databank:

- Have you seen this problem before ?
- How was it solved?
- How long did it take?
- What parts were needed?

Similarly, when confronted with a problem, I ask my on-board computer if I have seen this before and what did I do or learn? I also believe my computer is as much in my heart as in my mind. I call it gut feeling, and it often works better in the outdoors when I feel I am really alive! To me, it is worth listening to my heart with all its emotions, feeling good or feeling bad, and if it is bad, whose fault is it? We rarely accept that it might be our own. I rely a great deal on my gut feeling, which I see as a micro-seconds distillation and comparison with the whole of my life's experiences, good, stupid or bad, and having had to live with the results of my decisions and behavior; thus it is pretty accurate.

We now have a whole industry in Britain for quick fixes and emotions, but one that appears to avoid allocating blame (really avoiding taking responsibility for the results). For example, farm visits are now deemed by the Department of Education to put young people at risk, not from machinery but contamination from animal feces, although there appear to be no deaths. It's all rather theoretical or secondhand.

We even have a prescription in the United Kingdom for young people called the "Pathway Award" for theoretically plotting one's way through life. Although it appears experiential, it seems to offer no feedback or evaluation on an individual's ability to handle life. Instead, to me, it is just badge- or certificate-collecting with all that it entails.

But what if our minds are young and not too full of life's skids? I believe the best pathway is the outdoors, although it is not the only way. To me, it is the best way to balance formal learning or training. For example, the head of a school I visited earlier this month said they use the outdoors as a lubricant. "When we get the pupils outside the classroom, share an experience with them and it works, then we have their attention and mutual respect in the classroom. Thus to us the outdoors is an essential component of achieving classroom success."

It is the outdoors that can provide the learning to assimilate the skills of life. We know how it works. We see it and feel it and smell it through the elements. In short, it works through the intrinsic value of practical learning:

- I hear and I am aware.
- I see and I know.
- I do and I understand.

Evaluation and Measurement

But how do we measure the change? So far I have not seen any published methodology of measuring individual growth or performance, though there are copious examples of program, activity, and group analysis backed by anecdotal evidence and personal and parental testimony. Sometimes this is also the work of what I call outdoor groupies "who have climbed to touch the face of the stars" to produce somewhat subjective and observational assessments.

But what about individuals themselves? It was seeing the t-shirt with the "I faced the ecosystem and survived" slogan that made me think. Rarely have I seen individuals drawing conclusions themselves, reflecting on their experiences and recording their own performance.

A method I have developed, and to me the most valuable, is to get young people to ask truly adult questions about themselves, about the way they have performed. This should be about specific experiences over a measurable time span involving a series of events and personal changes, not on-off experiences. Through asking themselves questions, reflecting on their answers, and giving themselves feedback, individuals can see how they dealt with reality and are able to analyze their own performance. Thus in a nonjudgmental and noncritical way, possibly avoiding any self justification to refute perceived criticism, they can see the truth about themselves or know if they are dodging the issues. The situation under review needs to allow for this and must include:

- Time to reflect on what happened and for the individual to see how they reacted.
- A program that is not so active and stressful that all the time is taken up with personal survival, leaving no energy for reflection.
- Open situations promoting new discoveries.

We can enable individuals to review their performance through a detailed questionnaire that promotes self-inquiry and can only be answered from firsthand experience and (growing) emotional literacy. Such an approach sets up a cycle of questioning and inquiry:

- Reviewing: Thinking over and reflecting on the experience.
- Drawing conclusions: Realizing what the experience meant and what was learned.
- Planning: Reflecting on the conclusions and preparing to take action on the discoveries.
- Getting things done: Putting plans and discoveries into action.

The questionnaire looks like this: First an explanation to set the scene and second the questions themselves (fig. 1).

In this section we ask you to reflect back to how you felt at the time of your initial briefing and decision to join the expedition. Think about your feelings at the briefing, imagine what you were like then, and put a symbol in the appropriate column to indicate your thoughts:

a. If you were pleased with your performance.
b. If it was adequate but you would like to do better.
c. If you were disappointed and want to see an improvement.

Repeat the exercise on the second copy of the questionnaire, recording your feelings at the end of the expedition. Lastly, hide the sheet away for up to 3 months and then fill in the final column. When you make a record of your thoughts, it is best not to look at your answers so you are not influenced. After completing each questionnaire compare it with the previous ones. Has the picture changed? Why do you think this is? Were you pleased or dissatisfied about this? What action can you take alone or with others to change things? You may even talk it over with your " best friend." That may take courage.

Figure 1—Explanation to set the scene for self-assessment.

These can be varied to suit the learning and development aims. Most importantly, they are asked over predetermined intervals from before the experience, during, at the end, and say 3, 6, or 9 months after events (fig. 2).

By comparing the answer changes, an individual's development, and hopefully enhanced ability, becomes self-evident and the truth addressed in private! This is far preferable to a third party making a subjective assessment, which may be taken as criticism.

The most amusing example I can give, accepting that the process requires absolute personal honesty, was the young man who, when reflecting, said, "I hate my mates doing experiments on my brains," when trying to decide how to assess his ability to work with others. One very good question I often include is: How well do I understand what is going on around me, or do others listen to what I have to say (and if not, why not)?

Conclusion

As in so many things, the best person to make judgements is often the person involved. I also believe there is enormous scope to research to develop this area. However, as most of us may know, it is much more interesting to express an opinion about others.

THE QUESTIONNAIRE

ABOUT MYSELF	EXPEDITION Briefing	Begin.	End	Post
1. How effective were my contributions to events and discussions?				
2. How good am I at listening to others?				
3. How good am I at communicating and putting my ideas over clearly?				
4. How successful was I in getting others to join in and contribute to tasks and discussions?				
5. How good am I at working with other people to make an effective team?				
6. How good am I at helping others to achieve success for themselves?				
7. How well do I handle difficult people?				
8. How good am I at influencing others?				
9. How good am I at gathering the information needed to make a contribution?				
10. How well do I cope with problems?				
11. How good am I at coming up with ideas?				
12. How good am I at learning from others?				
13. How much do I know about what is going on?				

Figure 2—Self-assessment to promote self-inquiry.

Environmental Perception: The Influence of Wilderness on United States Artists, Writers, and Their Legacy

Charles O. Mortensen

Abstract—The 19th century produced a wide array of landscape artists and writers of prose and poetry who helped to sensitize a nation toward a greater understanding of the entire spectrum of natural resource values and services. Highlighted are William Cullen Bryant, Thomas Cole, and Henry David Thoreau. Each not only celebrated wilderness, but through their intimate contact with the natural environment, they exhibited personal growth, which embraced a widening set of human values. They and others like them, helped to spur a legacy of resource protection that has endured for a century and formed the majority of the National Wilderness Preservation System in the United States of America.

"The heritage of the past is the seed that brings forth the harvest of the future." These prescient words inscribed on the pedestal outside the National Archives in Washington, DC, elucidate the many activities of man that later come to fruition as improvement in the life and condition of society. Yet, throughout the 19th century our collective stewardship of the nation's resources made it unclear as to the harvest it would bring, for it was a time when advancing technology and industrialization utilized resources in an all-too-often profligate manner, with the concomitant harvest of deforestation, sediment-laden waterways, mineral waste, diminished air quality, and extinction of species. However, by the latter part of the 1800's and the beginning of the 20th century, there was to come another harvest, one born of increasing perception and sensitivities to the land and resulting in the world's first National Park, setting aside millions of acres in forest reserves, and initiating laws protecting wildlife and other acts of insight toward the ecosystem in which man is but a part.

What led to this latter harvest—this beginning of national consciousness, when the very word conservation became a part of our lexicon? Certainly there were many contributions—early ordinances regulating forest cutting and periodic regulation on utilization of wildlife in some colonies. Then came the artists and writers/naturalists valuing landscape esthetics, celebrating nature purely for its existence, and acknowledging a species' "right" to live in perpetuity. Those who "broke the trail" for this aspect of environmental perception were several, and the entirety of contributors cannot be discussed in the scope of this paper. Yet, we hold the banner high for those who sensitized the United States public to the inherent value in protecting not just some of nature's "parts," but all of them.

Three of the 19th Century

I have selected three artists/writers who left an indelible mark on humankind. Additionally, I have narrowed the timeframe to the 19th century because this was a time, as I have stated earlier, when the United States was using its natural resources in a most profligate manner, bespeaking both advancing industrialization and population growth.

William Cullen Bryant

Like all humans given to contemplative thought throughout their lives, Bryant shines in relation to intellectual growth related to a more holistic or encompassing philosophy, vis-a-vis nature. If we compare poems such as "The Yellow Violet" and "To a Waterfowl," which are celebratory poems for individual aspects of nature written in his 20's to "The Prairies" written a decade later, intellectual growth is readily apparent, for in the latter poem while he celebrates the prairie beauty,

> Lo! They stretch
> In airy undulations, far away,
> As if the ocean, in his greatest swell,
> Stood still, with all his rounded billows fixed...

he also acknowledges the bison's removal from the Illinois tall grass prairie to the foothills of the Rocky Mountains,

> The bison feeds no more. Twice twenty leagues
> Beyond remotest smoke of hunters camp,
> Roams the majestic brute, in herds that shake
> The earth with thundering steps-yet here I meet
> His ancient footprints stamped beside the pool.

and finally ends by forecasting the prairie's doom resulting from the tide of advancing agricultural populations, yet for the moment it is still wilderness minus the great bison.

> I hear the sound of that advancing multitude...
> Blends with the rustling of the heavy grain
> Over the dark brown furrows. All at once
> A fresher wind sweeps by, and breaks my dream,
> and I am in the wilderness alone (Jones and others 1952: 359-361).

Hans Huth (1990), writing in his seminal book "Nature and the American," notes an aspect of Bryant's growth. Referring to an 1834 visit to Italy, Huth states that Bryant

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felt the Italian mountains were more picturesque than the mountains in the Eastern United States, but he then quotes Bryant: "if the hand of man had done something to embellish the scenery, it has done more to deform it...the simplicity of natural scenery, so far as can be done, is destroyed" (p. 33). He further quotes Ralph Waldo Emerson, the noted 19th century writer/philosopher who commented on Bryant's half century (1820's to 1870's) impact on American thought in relation to the environment: "... first, and he only made known to mankind our Northern Nature - its summer splendor, its autumn russets, its wintry lights and glooms" (p. 36). Poet James Russell Lowell wrote these words of tribute:

> The voices of the hills did his obey; of the torrents
> flashed and tumbled in his song;
> He brought our native fields from far away... (p. 36).

Finally, 6 decades after his first published poem, and illustrative of his widening intellectual depth, he penned these lines upon the death of President Abraham Lincoln:

> Thy task is done; the bonds are free:
> We bear thee to an honored grave,
> Whose proudest moment shall be
> The broken fetters of the slave.
> Pure was thy life; its bloody close
> Hath placed thee with the sons of light,
> Among the noble host of those,
> Who perished in the cause of Right (Jones and others
> 1952: 364).

Thomas Cole

Next we turn to the celebrated work of artist Thomas Cole, who from his early childhood hoped he would leave his native England for the then lush wilderness of the newly formed United States of America. Emigrating to the United States with his family in 1818, it was but 5 years later that he left for Philadelphia to earn a living through wood engravings and illustrations. While his commercial art sold, his initial landscape paintings did not. Rejoining his family in New York, his landscapes attracted the attention of George Breun, Director of the American Academy of Fine Arts, who purchased them and helped fund his sketching trip up the Hudson River Valley. Cole found the Valley as magical as he had envisioned.

Returning with ample sketches, he sold his first Hudson River landscapes in 1825, which in one example, "Lake with Dead Trees," depicted the full reality of some wilderness settings, in this case decaying trees, which some critics impute were meant to also convey the full range and ultimate end of human life. Whether this was a primary intent of Cole is not known; however, it may have been his acknowledgment that we are integral to, and part of, one system. This important painting and sale (1825) is generally considered the beginning of the famous Hudson River School or style of painting as elucidated by subsequent artists such as Asher Durand and Frederic Church (Bertrand 1989). Additionally, his depiction of robust and gnarled trees, rugged rock outcroppings, light-bathed hillsides, towering peaks, swirling clouds and reflecting water through his landscape "In The Catskills" relates well to a range of esthetic pleasures found in wilderness.

In 1833, Cole moved to Catskill, New York, married, began raising a family, and completed the bulk of his wilderness landscapes, which helped to move a nation toward increasing understanding of the noncommodity values of the natural resource base, particularly its esthetic qualities. His paintings were true to a philosophy acquired earlier in his life, and expressed to a patron in 1826, "I believe with you that it is of the greatest importance for a painter always to have his mind upon Nature, as the star by which he is to steer to excellence in his art" (Ledgerwood 1985: 40).

It is Cole's consummate understanding and appreciation for natural beauty which, I believe, comes through to us in his "wilderness" paintings. Few can take this intellectual grasp as indicated in these insightful lecture statements:

> The waterfall may be called the voice of the landscape, for …the waterfall strikes its own chords, and rocks and mountains re-echo in rich unison (Cole 1980: 11).

> The sky will next demand our attention. The soul of all scenery, in it are the fountains of light, and shade and color and place them on canvas for generations to view (Cole 1980: 15).

Cole was an inveterate wilderness hiker carrying a knapsack, sketch book, and flute, which gave him knowledge of nature born only by those who are intimate with it. He wrote and lectured of his experiences. A notable example was his 1835 speech, delivered at the American Lyceum in New York City, where he stated his awareness of the sublimity of untamed wilderness and the majesty of the eternal mountains (Huth 1990). In that same lecture, he discussed the romantic ideals of grandeur, loveliness, and the sublime melting into the beautiful as expressed through waterfalls, rivers, forests, and the seasons. Further, this wildness was the most characteristic feature of the American scene. Huth reveals Cole's growing intellectual perception toward the value of wilderness beyond the picturesque when he includes this Cole quote in his summation of his work: "American associations are not so much of the past as of the present and the future—and in looking over the uncultivated scene, the mind may travel far into futurity" (p. 51-52). It is apparent then, that he, like Bryant, was sensitive to the eventual diminution of the American wilderness in the Eastern United States as he ends his futurity comments by stating, "where the wolf roams, the plough shall glisten; on the gray crag shall rise temple and tower..." (Cole 1980: 17).

Author Lynne Bertrand (1989) asks this question of Cole scholar Elwood Parry, III, "Did Cole influence the idea of wilderness in America?" Parry responded, "There are those who would argue he invented it" (p. 44). Additionally, Robert Magrath (1991) in his analysis of Cole's paintings states, "Through Cole's pictorial intervention, American nature gave up its negative connotation.... His art imbued the wilderness with a new found esthetic and moral respectability" (p. 12). Finally, illustrative of his personal growth, he was an outspoken critic of the Catskill-Canajoharie Railroad cut through a forested area north of Albany, New York. Bertrand (1989) states that his stance on the cut may place him in the category of early U.S. conservationists and quotes his writing on the aforementioned railroad cut, "Beauty should be of some value among us...where it is not necessary to destroy a tree or a grove, the hand of the woodsman should be checked" (p. 44).

Henry David Thoreau

Perhaps no one is so identified with the American movement for wilderness than Thoreau, for it was his clarion call in an 1851 lecture titled "The Wild" where he stated, "I wish to speak a word for nature, for absolute freedom and wildness..." (Anderson 1973: 133) that arguably is the historical antecedent for the foundation of modern thought concerning the many inherent values of wilderness. Additionally, few, if any, writers can show such a remarkable personal intellectual growth over a lifetime. In the 1830's he begins writing his journals, which would eventually lead to over two million words. Initially they centered on astute nature observations, thoughts on human relationships, short aphorisms, poetry on a variety of subjects, and epigrams. One moment he reflects on the eye revealing the soul of man, the next that music is the sound of the circulation in nature's veins and, "The healthy ear always hears it, nearer or more remote" (Thoreau 1984: 251).

These early Journal years also contain thoughts related to his trip on the Concord and Merrimac Rivers in 1839, which resulted in his first published book (1847).

> Consider the phenomena of morn, or eve, and you will say that Nature has perfected herself by an eternity of practice,—evening stealing over the fields, the stars coming to bathe in retired waters, the shadows of the trees creeping farther and farther into the meadows, and a myriad phenomena beside (Thoreau 1984: 443).

Concurrent with his observations on the rivers is one of his first essays, "A Winter Walk," published in an 1843 volume of the "Dial." "The wonderful purity of nature at this season is a most pleasing fact. Every decayed stump and moss-grown stone and rail, and the dead leaves of autumn are concealed by a clean blanket of snow" (Jones and others 1952: 883). As he continues, every student of nature, professional and amateur alike, can relate to his comment that while the snow is cold and powdery he feels the "warmth" of an inner glow brought about by his thoughts and feelings resulting from the intimacy of this joyous morning in nature. It is what Odell Shepard (1927) refers to as "a beauty that invites my collaboration and seems to need my comment—a beauty, in short, that can be harvested only by a quiet eye" (p. 242).

Thoreau ends his winter essay by moving into social commentary on religion as he states, "We know of no scripture which records the pure benignity of the gods on a New England winter night" (p. 891). He seems to be saying that if Hebrew prose, in part, conveys "beauty" then it is no more beautiful than the crisp stillness of this night. Commentary such as this was but prelude to a far deeper social consciousness culminating in the essay first titled "Resistance to Civil Government" and published in 1849. Later retitled as "Civil Disobedience," it was all but neglected in the 19th Century, yet now considered one of his most important statements and is said to have had great influence on Mahatma Gandhi and Martin Luther King in their struggles for freedom from oppressive rule and for civil rights of all individuals respectively. A careful reading of his essay clearly shows why this claim would be true.

Thoreau points out that in a nation founded on liberty, one-sixth are now enslaved, and a nation (Mexico) is being unjustly overrun and conquered militarily. He states, "...I think that it is not too soon for honest men to rebel and revolutionize" (Jones and others 1952: 894). Here then is the maturing Thoreau standing against, in his eyes, an unjust government and stating that a truly just government would have the sanction and consent of the governed. His essay ends with a tremendously powerful comment:

> There will never be a really free and enlightened State until the State comes to recognize the individual as a higher and independent power, from which all its own power and authority are derived, and treats him accordingly. I please myself with imagining a State at last which can afford to be just to all men, and to treat the individual with respect as a neighbor... (Jones and others 1952: 907).

In 1851, 2 years after the Civil Disobedience lecture, Henry David Thoreau would speak at the Concord, Massachusetts, Lyceum and utter one of his most enduring phrases "...what I have been preparing to say is, that in wildness is the preservation of the World" (Anderson 1973: 144).

Conclusion

Of the legacy of these three prominent individuals we can say this: William Cullen Bryant's celebration of nature through poetry, public speaking, and as a newspaper editor; Thomas Cole's leadership of artists who would sensitize the new nation to value the esthetic splendors of natural landscapes; and Henry David Thoreau's unabashedly outspoken call for wilderness protection would collectively yield a "harvest." A harvest seeded by these individuals, and others as well, would culminate in protection of forests through State and Federal reserves (later National Forests), wildlife through laws and refuges, and scenic grandeur through National Parks. Eventually this harvest would form the majority of wildland from which the National Wilderness Preservation System would "grow." Beyond that there is a "third" harvest—for all who are acquainted with the words and artistry of these three 19th century Americans have "grown" as a result of knowing them.

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The Wilderness Guides Council: Expanding Professionalism and Community Among Leaders of Wilderness Vision Quests and Rites of Passage Programs

Marilyn Foster Riley

Abstract—The Wilderness Guides Council is a global network of leaders offering modern wilderness vision quests or vision fasts, rites of passage in nature, and other earth-centered healing activities. By 1988, there were enough leaders conducting rites of passage that many of them wanted to share their common concerns and interests. So, from an initial meeting that year of 26 guides, periodic gatherings every few years evolved into the Wilderness Guides Council of 200 members that now meets annually.

Six unifying concepts are the principles or foundations around which the Wilderness Guides Council organized:

1. We adhere to an ethics statement.
2. We operate a site registration system for members running programs in California.
3. We work as a network rather than as a hierarchy.
4. We operate using the practice of Council to let everyone speak and be heard.
5. We focus on the spiritual and healing values of wilderness.
6. We use ceremony and ritual to enhance the meaning of, and commitment to, our work.

The Wilderness Guides Council is now ready to address a bigger picture, including: supporting the wilderness movement; helping land managers; and speaking for the spiritual and healing values of wilderness. But the greatest value of the Wilderness Guides Council is as a place to renew our hearts, our passion, and our souls for the work done by members, and to build loving relationships among all of us, so we can care more for each other and the Earth.

Evolution of Modern Wilderness Vision Questing

Vision questing is an ancient practice, and most indigenous cultures had some kind of rite of passage in nature through which their people, especially their youth, marked their passage from one stage of life to another and searched for meaning and direction. So modern vision questing is really based on the resurrection of an ancient, time-tested practice.

The modern vision quest was energized in the 1970's by several people whose efforts contributed to the growth of questing and thus to the formation of the Wilderness Guides Council. Among these pioneers were Joseph Jastrab in the Northeast, John Milton in the Southwest, and Sun Bear in the Northwest. However, the modern vision quest evolved primarily from the efforts of a cluster of vision-questing pioneers in California.

In 1973, Tom Pinkson, then a budding young psychotherapist, was studying the effects of outdoor activities, such as mountain climbing, river rafting, cross-country skiing and the new (old) activity of vision questing, on recidivism of substance-abusing youth. His research indicated that the vision quest, with its time for deep reflection by the young addicts on what they were doing to their lives, was most effective (Pinkson 1975). Today, Dr. Pinkson, now a psychotherapist in private practice, continues to lead quests for clients seeking vision and meaning as part of his therapeutic practice.

Leading this first vision quest with Tom Pinkson was a young university professor in transition, Dr. Steven Foster, who had begun formulating the idea and need for contemporary rites of passage while teaching humanities at San Francisco State University. While studying mythology he began to envision a school to teach people in transition or crisis how to enact a meaningful, symbolic rite of passage in a natural setting to formally confirm the resolution of their crisis, and passage. (Foster and Little 1988). Following that vision quest with Pinkson, Foster pursued his dream and by the late 1970's, he and his wife, Meredith Little, were running vision quest programs in the San Francisco Bay Area in an organization called Rites of Passage, Inc. Over several years, they and their staff (the author included) took hundreds of youth and adults on wilderness vision quests. From their efforts, interest in vision questing grew, as did the bureaucracy and workload at the Rites of Passage organization. In 1983, Foster and Little moved to Big Pine, California, to establish the School of Lost Borders, where they still run vision quests, train vision quest leaders, and continue their scholarship (Foster 1995; Foster and Little 1998). I also left Rites of Passage that same year but continued the work and lead quests today with my own company, Wilderness Transitions, Inc. The Rites of Passage organization continues under the direction of Mike Bodkin in Sonoma County, California.

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During this same era, Professor Robert Greenway was establishing a wilderness psychology program at nearby Sonoma State University, where he imported methods he used in helping develop Peace Corps Volunteers' training programs using solo fasts. Several of Professor Greenway's former students have become vision quest guides and teachers, and his contributions to the field continue (Greenway 1996).

Even before modern vision questing was reenergized, other organizations were also using solo fasts as part of their wilderness programs, such as Outward Bound. Their efforts helped pave the way for fasting as a modern personal growth tool in the wilderness, but as outstanding as their programs were, and are, their emphasis is not on formal rites of passage or spiritual journeys. This is a key difference, for it is the marking of life passages with a spiritual journey into the meaning of one's life that distinguishes vision questing from other outdoor programs using a solo fast (fig. 1).

Organizing in Support of Modern Vision Questing: The Wilderness Guides Council

By 1988, there were enough leaders conducting wilderness rites of passage that many of them wanted to share their common concerns and interests. Thus, the Wilderness Guides Council evolved from an initial meeting in 1988 of 26 guides in what is now Death Valley National Park in California. In a beautiful desert setting we shared ideas from our programs, our concern for the wilderness and the impacts we encountered, and our common belief in the importance of this work. Our journal, "Circles on the Mountain," was born at that meeting.

Four years later, in 1992, more than 50 vision quest and other rites of passage guides from all over the country met at a retreat center north of San Francisco. Concern was building about how our use was impacting the wilderness, and a main product of this gathering was the idea of self-regulation, in which the loose network of guides operating in California would register the wilderness sites they used with a "netkeeper." We also agreed to voluntarily limit use of our sites to once per year in desert areas and no more than twice per year in forested areas.

In 1993, we met again and took a further step toward organization by formally agreeing that all of us would follow a "Wilderness Ethics Statement" in leading our programs. It seemed an unprecedented achievement at the time, the agreement among these diverse and independently minded guides, to register and self-regulate their use and to follow strict ethical guidelines.

We organized even more after that 1993 meeting and have had annual conferences since then. At one conference we developed a purpose statement, claiming: "We are a network of wilderness guides whose purpose is to maintain and improve the health of wilderness ecosystems." We used the word "guide" in the hope that we might appeal to a wider range of wilderness program leaders. We also continued to refine our wilderness ethics statement, and developed a PLAN, setting forth such things as membership standards and organization principles.

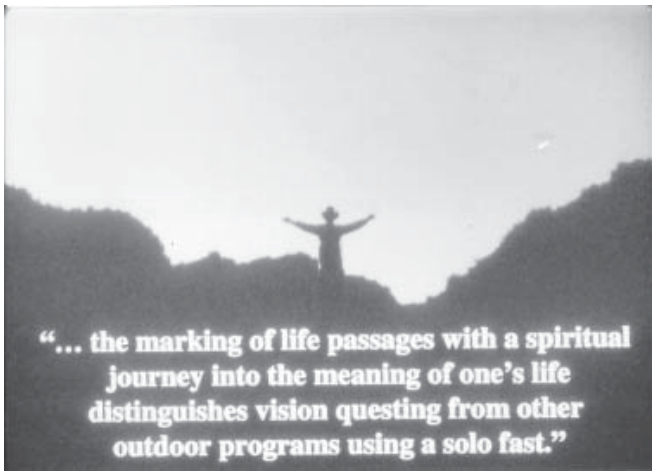

Figure 1—Two themes of the Council: by maintaining the health of wilderness ecosystems, spiritual values are also protected; and human exposure to healthy, balanced, natural ecosystems helps people come into balance.

Our 1996 meeting was important because we invited outside presentations on permits, fees and liability insurance by wilderness leaders from the Forest Service, Bureau of Land Management, National Park Service, and the Worldwide Outfitters and Guides Association (the largest insurer of wilderness programs). Following this meeting we formed an Insurance Committee, made available model permit applications for our members, and established a Steering Committee and a Conference Agenda Committee.

To deal with our growing membership, now 200 strong, and an annual 3-day conference (fig. 2) that draws 75 to 100 people, we've evolved to a higher degree of organization. While most members welcome this organizational maturation, we are constantly being pointed back to the unifying ideas around which we organized. Following are what I see as six unifying ideas around which the Wilderness Guides Council (WGC) organized, and which I believe make us unique.

Wilderness Guides Council Members Adhere to an Ethics Statement

We organized around a purpose statement:

> We are a network of wilderness guides whose purpose is to maintain and improve the health of wilderness ecosystems.

This purpose statement, which quickly grew into a more lengthy ethics statement seeking to reduce our impact on the wilderness, expressed the compelling reasons that brought us together. Agreement to abide by the ethics statement was, and is, a requirement of membership. The ethics statement emphasizes an attitude of respect, reverence, and appreciation for the lands we visit, and is embodied in 17 specific rules of behavior to which members commit to minimize impacts. For example, Item 15 states "We dismantle any old stone piles, circles, firepits, or other human markers we may find" (except mining claims). Leaving evidence from spiritual practices give earth-centered

Figure 2—The Wilderness Guides Council evolved from an initial meeting of 26 vision quest and rite of passage guides in 1988 to a membership of 150 in 1998 with an annual 3-day conference (photo by Marilyn Riley).

healing a bad name, and is one of the reasons we organized around an ethics statement that focuses on minimizing all impacts of our use. Now some members are talking about expanding our ethics statement to address leader-client relationships, and also to protect the spiritual values of wilderness that is so important to our members' programs (Riley 1997).

Self-Registration of California Use Sites with the Council

Another requirement of membership is registration of sites used by members' programs in California. Compliance with this requirement is not perfect, but most members running trips in California participate so they can coordinate their use with other members. Since an increasing number of leaders are being trained and are attempting to launch their own programs, it is important that someone knows who is using what areas and when. The site registration system has helped avoid some conflicts, coordinate use, and point new guides to unoccupied territory. But it's getting crowded in the wilderness. Suitable areas not already being used are hard to find—especially since the ethics statement limits use of desert areas to no more than once per year, and forested areas to twice per year.

Site registration is a sensitive issue because some guides are reluctant to reveal special places they have found, and some resent any kind of regulation. We do not disclose member sites to land management agencies, despite some casual requests. The Council does not require members to obtain agency use permits and liability insurance, but the fact that most of our well-established programs and experienced elders obtain such permits and liability insurance provides leadership by example. I believe there is growing consensus (if not a formal position) that favors all of our members who run their programs on public lands to fully comply with all the required permits, fees, and insurances.

Wilderness Guides Council is a Networking, Non-Hierarchical Organization

The Council is organized as a network, like a "knotted fish net with a multitude of nodes or cells of varying sizes, each linked to all the others"—flexibly, freely, and democratically interlinked—"a segmented, polycephalous [many headed] network," as anthropologist Virginia Hine, one of our founders, called it. The nodes of the net are members and their programs, and all have an equal voice. A netkeeper provides coordination and business management, and a few committees help do the work.

Our network, as opposed to a strictly hierarchical organization, intends to promote a spirit of equality and community among our members. The larger membership works using a council process. It requires that important decisions be made after we have listened to one another and have had the opportunity to speak our own hearts and minds. Our committees, the Steering Committee and Conference Agenda Committee, operate by consensus, taking into account the input of members, much of which is received in council discussions at the annual conference. Relying on the council process for critical input to decisions is time consuming, but we believe it leads to many rewards.

We Operate Through the Practice of Council

As a network seeking equality among members, we use the ancient practice of council in our meetings, giving every

member present the chance to speak in turn, and to be heard. In this process we are also able to pay particular attention to the views of our elders—those members with demonstrated wisdom and experience. The positive rewards of sitting in council, where everyone has an equal voice and the right to be heard, are in the personal understanding, empathy, and sense of community that evolves.

We are fortunate to have among our members a number of people experienced in the practice of council, including Virginia Coyle, coauthor of a book titled "The Way of Council" (Zimmerman and Coyle 1997), and Sedonia Cahill, also an author on the topic (Cahill 1992; Garfield and others 1998).

Key guidelines of the practice include: listening and speaking from the heart, spontaneity and brevity in expression, and self-restraint in taking the floor to speak—are my words really needed to make a difference? We practice patience to hear whatever "personal" or diversionary issues come up, because if such issues are not addressed during the council, they will surely return to complicate any resulting actions. Skillful and balanced leadership is needed to see that the tasks at hand are kept in front of the group.

The practice of council is continuing to evolve as a key tool of the Wilderness Guides Council. It's what most of our members want to spend more time doing at our 3-day annual conferences. The sharing feeds our hearts and souls and heals us for guiding—the heartwork that is the focus of our wilderness business.

Focus on Spiritual Values and Healing

Another unifying point in the Council is our recognition and support for the spiritual values and healing qualities of wilderness. Two central ideas here are: (1) that by maintaining the health of wilderness ecosystems their spiritual values are also protected; and (2) that human exposure to healthy and balanced natural ecosystems helps people come into balance. People, after all, are natural creatures. We evolved in the wilderness and the wilderness is in us. No wonder it feels like home. Anthropology and archeology tell us that, from the most ancient times, people have believed in the spiritual and healing values of wilderness. Modern, urban people need access to those values too, and a recent study shows they are a major appeal of vision questing to the public (Riley and Hendee, this proceedings).

Ceremony and Ritual Uplift and Deepen our Meetings and Work

As guides committed to leading people in making changes, or rites of passage in their lives, ceremony is one of our most important tools, that is—symbolic actions that have purpose and positive meaning to all those involved. Simple ceremonies and rituals are used by most members during their wilderness work. Some example are use of the four directions as a symbolic system of life stages linked to the seasons of the year (Foster and Little 1996; Foster 1998), the idea of crossing thresholds, and symbolic actions surrounding letting one's old self die so a new self can be born.

Ceremonies and rituals also provide the binding agent or "glue" for our annual conferences. For example, we begin and end our conferences with a sharing circle, or council. We maintain an altar, not to worship, but to provide a place for symbolic objects, like stones, representing each member. We also use a staff, or talking stick, in council to designate the current speaker and empower them to speak their truth from their hearts, and for all others present to listen carefully. Such simple ceremonies and rituals help make our conferences memorable, meaningful, and reinforce commitment to our work, our own growth and support of one another, and our desire to be good stewards of the Earth.

We Must Do More

We've spent the last 10 years organizing around these principles, but we now seem ready and able to address a bigger picture, and contribute more to the wilderness protection movement. Here is my vision as Netkeeper.

We Must Support the Wilderness Protection Movement

The Wilderness Guides Council needs to reach out and link up with other wilderness organizations in promoting protection of the ecological, and thus the spiritual and healing, values of wilderness. We hold in common a concern for the well-being of wilderness and a desire to heal the land. We can help other organizations, and they can help us. Some of the approaches we use in vision quest and rites of passage work, and in the Council, can be helpful to other organizations in the wilderness protection movement.

We Need to Help Land Managers

As I've become more acquainted and involved with land managers the past few years, I've come to realize several things. First, most land managers don't know about the Wilderness Guides Council, and have little factual information about wilderness vision questing and rite of passage work. Some managers have misguided notions about our practices based on rumor, and some unfortunate incidents attributed to "us," such as finding ceremonial rock circles, prayer ties, and a few base camps left impacted and messy. But once they learn what our work is really about, our deep concern and respect for the health of wilderness ecosystems and their spiritual values, and the truly low impact of our use, they are very supportive. In fact, many managers have a great affinity with us and deeply respect our "pure and benign" use of wilderness and concern for its spiritual values. We need to expand our acquaintance and make friends with the land managers

Second, wilderness managers really need our involvement and that of other environmental organizations to balance the loud voices of competing interests such as grazing, mining, military, hunting and shooting, off-road vehicles, and others whose use impacts the wilderness.

Third, we need to be involved in wilderness planning processes, speaking out at meetings and writing letters, keeping up with the steady stream of threats to wilderness

quality. We need to oppose the dilution of wilderness quality by all uses and actions that impact it.

We Must Speak for the Spiritual and Healing Values of Wilderness

Spiritual and healing values are embodied in the sense of sacred space that is nurtured by the silence, the naturalness, and the solitude of wilderness. With those attributes present, the spirits of a place can reveal themselves, and the wilderness can become more valuable for spiritual insight and healing. The miracle of life and the force of creation are all around us. We can see our own lives in the cycles of nature. The death, rebirth, and growth of plants are a metaphor to life passages for people. The interconnectedness of all that is around us reminds us of our own interdependence on nature—and each other. Everything around us mirrors who we are and our connection to everything. The timely appearance of an animal, a bird, or a rock formation in the sun and shadows can be a messenger, reflecting to us what we need to learn. We feel a presence that reminds us we are not the first to walk or sit here, and this reminds us that we must protect these sacred places for those who will follow us.

Speaking out on behalf of the spiritual and healing values of wilderness is an important role for the Wilderness Guides Council in the wilderness protection movement.

Conclusions

In conclusion, I hope that the brief history and unifying principles on which the Wilderness Guides Council operates, and the vision for doing more, will help clarify the work of our members who guide wilderness vision questing and rites of passage programs. Increasing numbers of persons seek to go on such journeys into the wilderness, and more people are training to become program guides. Our evolving organization reflects this growth. But, the greatest value of the Wilderness Guides Council is as a place to renew our hearts, our passion, and our souls for the work we do, and to build loving relationships among all of us so we can care more for each other and the earth. I believe that this is also the greatest value of the World Wilderness Congresses.

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Wilderness Vision Quest Clients: Motivations and Reported Benefits from an Urban-Based Program 1988 to 1997

Marilyn Foster Riley
John C. Hendee

Abstract—A questionnaire survey of clients participating in an 8-day vision quest operated by Wilderness Transitions, Inc., from 1988 to 1997 yielded a 78 percent return. The vision questers were older than typical wilderness visitors; two-thirds were female, with the stated motives for questing suggesting a spiritual and deeply personal search for self-discovery, insight, and meaningful life transition. Reported benefits were greater connections to self, self-empowerment, and connections to other, reflecting an outward focus, including the spiritual idea of connection to all things. Respondents were emphatic that wilderness naturalness and solitude were essential to gaining their benefits. Findings and respondent testimony suggested a process by which increasing degrees of connections to self, culminating in feelings of empowerment, may then lead to experiences of spirituality, defined as "connections to other." This study documents that wilderness vision questing, an ancient, cross-cultural practice involving time alone in nature while fasting, also attracts modern people seeking personal growth and renewal, and demonstrates the spiritual and healing values of wilderness.

Wilderness Experience Programs (WEPs) take paying clients to wilderness for personal growth, therapy, and education, and are an important connection and source of healing between wilderness and urban society. These programs operate worldwide and appear to be increasing in the United States where an estimated 500 WEPs now operate (Friese and others 1998; Gager and others 1998). These programs are diverse, ranging from the well-known Outward Bound to others featuring wilderness education as a path to personal growth and wilderness therapy for adolescents. Wilderness experience programs are an important and growing use of wilderness for human growth and healing.

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Wilderness Vision Quest Study

This paper reports results from a study of participants over 10 years in one kind of WEP, a wilderness vision quest program featuring time alone in nature while fasting (or solo fasts) that is commercially operated by Wilderness Transitions, Inc., a nonprofit educational organization near San Francisco, California (Riley and others 1998).

International Roots of Vision Questing

Vision questing, or vision fasting, is a spiritual tradition that has been practiced for millennia in countless traditional cultures around the world (Cruden 1996). It may best be known as a growing-up rite of passage for adolescents entering adulthood in some Native American cultures. The vision quest tradition among Native American cultures is described in many books, including Nabokov (1987), Lame Deer and Erdoes (1972), Storm (1972), Neihardt (1972), and Mahdi and others (1996). However, many indigenous cultures around the world practice similar rites of passage, initiation, or renewal, involving time alone in nature in search of insight as to who they are (self-knowledge), and direction and purpose for their next phase in life.

For example, rites of passage involving time alone in nature are reported among indigenous cultures such as: the Australian aborigines (Elkin 1948), the bushman of the Kalahari (Bjerre 1960), the Mayan Indians of Guatemala and Belize, the Zuni of New Mexico (Tedlock and Tedlock 1993), the Mende of West Africa (Gilmore 1990), and many others. These ceremonies of initiation and renewal are valued because they confirm the importance of the individual to the tribe. They provide a safe and valuable transition test bridging one life phase to the next and which, because of the discipline and guidance required, enhance the self-esteem of participants, develop character, and provide great social value for the tribe by enforcing the common beliefs and values of the community (Elkin 1948; Van Gennep 1960).

Modern Wilderness Vision Questing

Modern people have lost their vision, beliefs, and values. We feel separated from our roots in nature and in history. Fortunately, modern wilderness vision questing retains the three-stage process of traditional rites of passage: preparation (severance from everyday life), completion of a 3- or 4-day fasting time alone in nature (threshold), and reentry back into daily life (incorporation) (Foster 1995; Foster

and Little 1988). This-time tested formula for reconnecting to that which is most important to individuals and communities works to reconnect the body, mind, and heart (or repair the lost connection to earth and spirit). Constantly bombarded by the pressures of our culture, where many things profound or beautiful are trivialized or popularized, where life is for the young and beautiful, we are led to believe that status or material possessions will make us happy or that finding the right person, mate, or guru will solve all our problems. But of course that is not true—the answers lie within each of us—we just have to find them. Wilderness has long been known as a place of peace, self-discovery, and renewal, where it is possible to slow down and gain insights on the most profound issues in our lives (fig. 1). Such are the goals of modern wilderness vision questing (Hart 1996; Riley 1986).

We estimate that there are about 50 active vision quest programs in the United States, Canada, Europe, Australia, New Zealand, and South Africa, mostly small operations offering one to five quests per year, with perhaps a dozen programs leading six to eight a year, a few more than that. These findings are based on over 200 dues-paying members of the Wilderness Guides Council, the international organization of vision quest guides (Riley 2000). Most vision quest programs serve mixed groups of men and women, but some focus on specialized clients, for example, youth, women, men, families, recovering addicts, or persons in counseling.

Vision Quests by Wilderness Transitions, Inc.

One company that offers vision quests is Wilderness Transitions, Inc. They conduct five or six quests a year for clients who pay $595, plus their own transportation expenses, to attend four pretrip meetings, an 8-day trip to wilderness that includes 4 days and nights of solo fasting, and a trip reunion 2 weeks after the return (Riley and others 1998). The vision quests are advertised at activity fairs like the San Francisco Whole Life Exposition and in local resource directories such as "Common Ground," always inviting potential clients to a free slide show about the vision quest. After the slide show, viewers who are interested and make the financial and emotional commitment for going on a vision quest stay for the first pretrip meeting.

A Typical Wilderness Transitions, Inc., Vision Quest—The lifeblood of any business is satisfied customers, so questers are prepared carefully in four pretrip meetings, covering such things as how to prepare for the 4 days and nights of fasting alone, and what kind of backpacking equipment is needed. "Leave no trace" camping and safety procedures are taught. Travel arrangements are made. A constant focus is helping questers develop their intent—that is, what they hope to get from their quest.

In addition to practices such as journaling and recording dreams, time-honored rituals, ceremonies, and meditation techniques are often suggested as ways to help certain questers achieve their intent. A key part of the preparation is the nature walk, a day alone in the out-of-doors early in the preparation, and during which exposure to nature may stimulate deeper thoughts about the intent of one's quest (Riley 1997). Wilderness Transitions, Inc., has used the process described for 10 years. Other vision quest programs may vary in the time spent in different activities, but always include preparation, a solo fast, and sharing stories after the return.

Trips usually begin on a Saturday, when the six to 12 questers travel the 300 to 500 miles to a base camp near the end-of-road access (fig. 2) in a desert or mountain area

Figure 1—The wildrness vision questers we studies perceived wilderness as a spiritual, healing, and growing place where reflective experiences are available as an antidote to the pressures of modern society, and for life renewal and transition (photo by Marilyn Riley).

Figure 2—Wilderness vision questers travel 300 to 500 miles to a base camp near the end-of-road access in a desert or mountain area (photo by Marilyn Riley).

in California or Nevada; the location and elevation of the trip depends on the season. After setting up base camp and providing orientation and safety information, questers explore the area to find a solo site with their desired degree of isolation (fig. 3), but usually only one-half to 2 miles from base camp. In the evening, preparation continues around a campfire, always using a fire-pan and wood brought from home in desert areas. The next day, questers continue their search for a solo site and, on finding it, may take out some of the 4 gallons of water they will use during their fast—1 gallon for each day. During this time, a personal conference is held with each quester to help them further prepare, clarify their intent for the solo fast, relieve anxieties, and ensure safety.

Figure 3—After 2 days preparation in camp, questers spend 4 days and nights alone at a solo site fasting and reflecting (photo by John Hendee).

Group meetings in a traditional circle (council) these 2 days in base camp are rich in sharing of excitement and anticipation, further instruction in safety, and tips on journaling to record their questing experience and the abundant dreams that will come on the solo fast. Depending on personal preference, simple rituals and ceremony may be suggested to help questers get in touch with their feelings and address the issues that brought them on their quest. Early the third day in base camp, after hot drinks, a final group meeting and goodbys, the questers—now backpackers—go out to spend 4 days and nights alone. Each day they will leave a sign of their well being at a predetermined place in a mutual check-in with a buddy. On the morning of the fifth day they return to the base camp, usually clear-eyed and feeling empowered, to joyously greet their community of fellow questers. After a breakfast of fruit salad, a council is held where each quester's story is heard, acknowledged, and appreciated (fig. 4). High emotions continue in the now close knit group as the journey home begins, stopping at a hot springs or sauna, salad bar, and often camping overnight. Two weeks later a reunion is held, and questers share their experience in the hardest part of the quest—the return to daily life. Here they learn the truth of Black Elk's wisdom, that the real difficulty of a vision is living it in the world for all the people to see (Niehardt 1972).

Methods and Findings

Because we studied clients from only one wilderness vision questing program, operated by Wilderness Transitions, Inc., we make no claim that these clients represent those from other organizations offering similar experiences. The value of studying this one program is that during the entire 10-year period of the study, the same process was led by the same leader, Marilyn Riley (assisted by Betty Warren), which minimizes two potentially important sources of variation—the program process and leadership.

Figure 4—Vision questers share their stories with the group (photo by John Hendee).

How Many Questers?

During the 10-year period 1988 through spring 1997, a total of 297 persons went on vision quests with Wilderness Transitions, Inc.; 65 percent of them were women and 35 percent were men. Thirty of these individual quests were by repeat clients (about 10 percent), so we subtracted them and also subtracted 27 former clients whose addresses could not be located, thereby arriving at a total of 240 potential questionnaire respondents. Seventy-eight percent of these former vision questers responded to our one-page questionnaire after three mailings—a 76 percent response rate for women and 81 percent by men.

Who Were the Vision Questers?

The questers were almost exclusively urban, and while some had been camping, most had never been to wilderness. About three-fourths were from the San Francisco Bay area, but with an increasing number from out of state and some from other countries. Since this is a commercial wilderness program advertised to the public, we were interested in how these clients compared demographically to the typically young adult, upper middle class wilderness recreationists (Hendee and others 1990). We found them to be similar in that they were highly educated: 63 percent were college graduates, and 36 percent had done post graduate work. Not surprisingly, given this high degree of educational attainment, most were employed in upper middle class jobs such as healing and counseling (26 percent), business or government (24 percent), teaching/education (13 percent), and computer/technical (11 percent). We think it is interesting that more than one-fourth were employed in jobs in the healing and counseling category, which includes psychotherapists, nurses, massage therapists, and others one might expect to believe in the natural healing qualities of a vision quest experience in nature.

Thus, in education and occupation these vision questers resembled traditional wilderness recreationists, but they differed from traditional wilderness visitors in age and gender. The vision questers were older, 52 percent of them being over 40 and 17 percent being over 50 years old. Women outnumbered men two to one and were also older, with 62 percent of them being over 40 compared to 38 percent of the men. The predominance of women may be due to the fact that two women led Wilderness Transitions' trips. The leaders also felt that a great many of the women questers were seeking healing from wounds related to their gender, such as sexual discrimination, harassment, or abuse. The older age of the vision questers may reflect the greater likelihood of mature persons to seek introspective experiences.

Why Did They Quest?

Each respondent indicated their first and second most important reason for going on a wilderness vision quest from a list of common reasons gleaned from leader perceptions and trip evaluation reports collected by Wilderness Transitions, Inc., over the years (Anderson and Hendee, unpublished). Based on conventional wisdom about wilderness recreation, one might think that "adventure/challenge" and "recreation/nature experience" would have been selected as key reasons for going on any wilderness trip. Only 7 percent of these wilderness vision questers, however, selected "adventure/challenge," and only 3 percent selected "recreation/nature experience" as their most important reason for going on a vision quest (table 1). Further, only 9 percent selected "adventure/challenge" and 2 percent selected "recreation/nature experience" as their second most important reasons (table 1).

Table 1—First and second most important reason for going on a first vision quest.

Categories	First reason Total		Second reason Total	
	no.	*percent*	*no.*	*percent*
Spiritual journey/self-discovery	63	(33)	45	(24)
Personal renewal–fresh perspective	35	(18)	47	(25)
Life stage transition	27	(14)	22	(12)
Personal empowerment–strength	22	(11)	22	(12)
Resolve personal issues	7	(3)	12	(6)
Life work/more meaningful work direction	7	(3)	12	(6)
Grieving loss	9	(5)	5	(3)
Call to adventure/challenge	13	(7)	17	(9)
Recreation–nature experience	5	(3)	4	(2)
Physical healing	5	(3)	1	(11)
Total	193	(100)	187	(100)

The first and second "most important reasons" cited by our respondents for going on a vision quest were: "spiritual journey/self discovery" (33 and 24 percent); "personal renewal, fresh perspective" (18 and 25 percent); "life stage transition" (14 and 12 percent); and "personal empowerment" (11 and 12 percent). Thus, the motives for going on a wilderness vision quest overwhelmingly suggest a spiritual and deeply personal search for self-discovery, insight, renewal, and meaningful transition in these clients' lives.

What Benefits Did They Report?

We also asked the questers: "In your own words, what were the most important benefits you gained from participating in a wilderness vision quest?" On the average, respondents included two concepts in their narrative answer. We coded their responses to this open-ended question into 406 comments using qualitative analysis procedures described by Strauss and Corbin (1990). We began by tabulating key words and phrases actually used by the respondents (open codes), gradually combining them into 12 similar categories called axial codes and finally merging them into a few central themes called selective codes (table 2). Axial codes implied benefits relating to the "self" (56 percent), and 44 percent relating to what we call "other," or a greater connection to the larger universe.

Benefits Related to the self—More than half (56 percent) of the key words and phrases in the respondents' descriptions of benefits they said they received related to "the self" (table 2). There appeared to be a "Self Awareness

Table 2—Themes and key categories[a] of response to the question: " In your own words, what were the most important benefits you gained from participating in a wilderness vision quest? "

Key category	Response	Total response
	no.	*percent*
Connection to self		
1. Self connection/awareness	36	(9)
2. Self discovery/identity/purpose	26	(6)
3. Clarity/insight (self-understanding)	43	(11)
4. Self knowledge/acceptance	27	(7)
Self empowerment		
5. Self confidence/reliance	39	(9)
6. Facing fears/trusting nature	21	(5)
7. Empowerment/strengthened	36	(9)
Subtotal	228	56
Connection to other		
8. Connection to nature	60	(15)
9. Spirituality/connectedness	44	(11)
10. Healing/renewal	45	(11)
11. Community	23	(6)
Subtotal	178	(44)
Total	406	100

[a]These categories and themes were developed by open, axial, and selective coding of key words and phrases in the narrative responses, following qualitative analysis procedures described by Strauss and Corbin (1990).

leading to Empowerment leading to Connection with Other (Spirituality)" continuum in the pattern of responses (fig. 5).

There are two important elements in this continuum. First, the responses implied various degrees of depth of self-connection ranging from self-awareness (shallower) to feelings of self-reliance and empowerment (deeper). For example, benefit comments in category 1 "self-connection/awareness" seemed shallower than comments in category 2 "self-discovery/identity/purpose" or 3 "clarity/insight/self-understanding." The apparent depth of self-connection trend continues with category 4 "self-knowledge/acceptance," followed by 5 "self-confidence/reliance," 6 "facing fears/trusting nature," and then category 7 "empowerment/strengthened."

The data forming these seven categories are based on key words and phrases from individual respondents, which often implied that the person was at one point on the continuum or another. But actual phrases from some respondents implied movement along the continuum during the course of their quest. It was as if the fruits of increasing depth in "connections to self" are borne in feelings of self-reliance, courage to face fears, and empowerment.

Benefits related to other—Forty-four percent of the key words and phrases in the respondents' descriptions of benefits implied "Connections to Other" or the larger universe. Specifically, several categories reflect an outward focus on "other" rather than "self," for example, table 2, category 8 "connection to nature" reflects a focus on "other," category 9 "spirituality/connectedness," which included comments reporting feelings of being "interconnected to all things" or "the universe" (a spiritual idea). Likewise, category 10 "healing/renewal," reflected such things as "new perspective" and "new direction," which also implies a focus on "other" rather than self because they reflect a different (healed and renewed) view of the world in relation to the individual. For example, one quester wrote, "I gained a new perspective on my life. A renewal of my spirit. Reconnecting to the earth." Another quester wrote, "Fasting and solitude in the wilderness for 4 days provided the space to go inwards and relate to my own internal world while at the same time experiencing myself as part of the vast universe—that is, connection with inside and outside." Our "spirituality/connectedness" category included many comments such as "feeling connected to all things" or "oneness" that parallels the definitions of spirituality in the literature (McDonald 1989).

We believe these data suggest a process by which spiritual experiences in wilderness and nature may come about. That is: increasing degrees of connections to self, culminating in feelings of reliance, strength, and empowerment, may then lead to experiences of spirituality—defined as a focus on "other" rather than "self," including feelings of oneness and inter-connectedness to all things (fig. 5). It's as if one must progress from a strong connection to self in nature as preparation for experiencing spirituality in nature. For example, one quester said, "The benefit I gained from participating was having the experience of opening to continuous deeper layers and levels of myself and my surroundings."

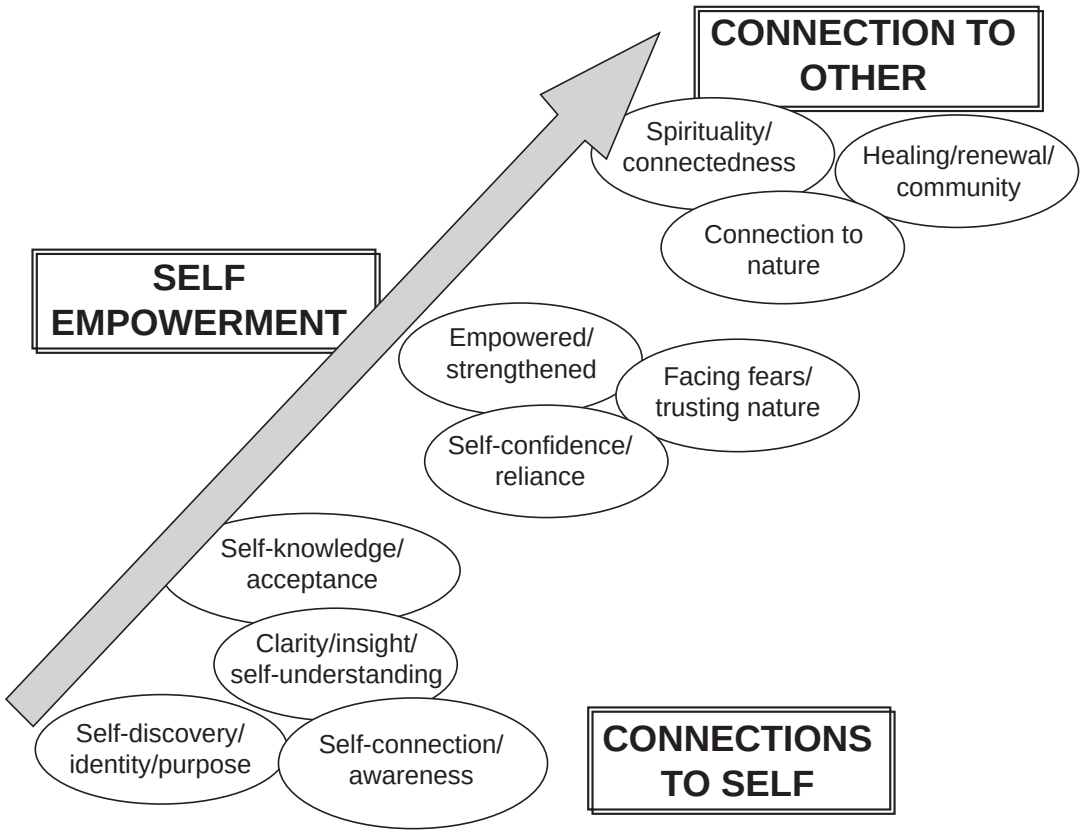

Figure 5—Benefit categories imply a process—increasing degrees of connection to SELF, leading to feelings of EMPOWERMENT, which may lead to spiritual experiences defined as connections to OTHER.

Another quester said, "The benefit I gained was the time alone away from all distractions to really search within and find my answers and I was able to [then] really connect through nature to my higher self."

We were surprised that comments reflecting "community" as a benefit comprised only 6 percent of our response because the group is an important part of vision questing, and strong bonds of friendship are formed in the course of sharing such a deep experience. But the data obviously indicate that such sociability, while important, is subordinate to the enhanced self-awareness, empowerment, and spiritual benefits.

Is Vision Questing Wilderness Dependent?

But is wilderness, defined as an area with naturalness and solitude, really needed for vision quests to result in the kind of self-discovery, empowerment, and spirituality benefits we found? The respondents in our study emphatically said "yes." When asked the question, "Would the vision quest experience have been just as effective in a developed recreation area with roads and campgrounds?" 100 percent of them said, "No!" Their reasons given to support this answer were: distractions (evidence) of civilization (25 percent); lack of solitude (26 percent); lack of (dilution of) naturalness (27 percent); threat of human intrusions (13 percent); and lack of (less) challenge (9 percent).

Thus, reduced solitude and naturalness, distinguishing characteristics of wilderness, were decisive reasons for rejecting "developed recreation areas with roads and campgrounds" as potential locations for a vision quest. Further affirming the importance of naturalness and solitude was response to a direct question: "How important was being in a wilderness setting with naturalness and solitude to gaining benefits from your vision quest?" Conclusively, 98 percent checked "very important," with the remaining 2 percent saying "important." Nobody said "unimportant" or "very unimportant."

Summary and Conclusions

Wilderness Experience Programs bring paying clients to wilderness and related areas for personal growth, therapy, and education. This study of wilderness vision quest clients (one kind of WEP) from a 10-year period, 1988 to 1997, revealed that the vast majority of these novice, urban wilderness users went on their vision quest in search of spiritual insight, personal transition, and renewal—not challenge adventure or recreation. These vision questers resembled typical wilderness recreationists in being highly educated and engaged in upper-middle class occupations, but they were older, and two-thirds were female. The reported benefits from their wilderness vision quest experience, which included 4 days and nights fasting alone, suggest that increasing degrees of connections to oneself in nature, culminating in feelings of self-reliance, strength, and empowerment, may then lead to experiences of spirituality. Here spirituality is defined as a focus on "other" rather than "self," and include feelings of oneness and interconnectedness to all things. It is as if one must progress from a strong connection with self in nature as preparation for experiencing spirituality in nature.

The questers were emphatic in their view that their vision quests needed natural surroundings, with 100 percent of them stating that their experience would not have been as effective in a developed recreation area with roads and campgrounds because of the lack of naturalness, reduced solitude, and distractions of civilization. Being in a wilderness setting with naturalness and solitude was cited as very important or important to gaining benefits from their vision quest.

In conclusion, we believe these findings reveal that:

1. Wilderness vision questing, an ancient rite of passage featuring time alone in nature while fasting, also attracts modern people seeking personal growth, renewal, and transition from wilderness experience. They quest in the wilderness because they seek to know who they are and the meaning of their life journey.

2. The vision questers we studied perceived wilderness as a spiritual, healing, and growing place, where reflective experiences are available as an antidote to the pressures of modern society, and for life renewal and transition. They document the spiritual and healing values of wilderness.

3. Naturalness and solitude, distinguishing characteristics of wilderness, were perceived as essential conditions for gaining the personal benefits reported by these vision questers. Protection of wilderness to insure the continued existence of areas with naturalness and solitude is important to modern people who may seek healing, new insights, and personal truth through wilderness vision questing and other wilderness experiences.

Acknowledgments

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Wilderness Therapy as an Intervention and Treatment for Adolescents with Behavioral Problems

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Abstract—Recent surveys have identified 38 wilderness therapy programs operating in the United States, and in this paper data from five such programs are projected to illustrate the vitality, relative size, and potential resource use of wilderness therapy. If we extrapolate the data as if they represented the 38 known programs, a suggested total of 11,600 clients were served in 1997 and 12,005 in 1998, generating 340,290 wilderness field days (wfd) in 1997 and 392,000 wfd in 1998, respectively, and generating annual gross revenues of $128 million dollars in 1997 and $143 million dollars in 1998.

Better communication between wilderness managers and wilderness therapy leaders would help close an existing gap in understanding between what are necessary and desirable practices for the benefit of wilderness. This is a concern for wilderness therapy programs because they need wilderness to operate as well as wilderness mangers who are mandated to protect the ecological integrity of wilderness. This strengthened relationship can help deal with misperceptions about wilderness therapy, minimize impacts on wilderness, and maximize benefits from wilderness therapy as a positive intervention in the lives of troubled adolescents.

Wilderness therapy is an emerging intervention and treatment in mental health practice to help adolescents overcome emotional, adjustment, addiction, and psychological problems. The wilderness therapy process involves immersion in an unfamiliar environment, group living with peers, individual and group therapy sessions, educational curricula, including a mastery of primitive skills such as fire-making and backcountry travel, all designed to address problem behaviors and foster personal and social responsibility and emotional growth of clients.

Mental health providers, insurance companies, and juvenile authorities are beginning to accept wilderness therapy as a viable alternative to traditional mental health services because of its relative effectiveness and lower cost compared to traditional residential and outpatient treatment. Following is an overview of wilderness therapy, drawing on our recent research on the use of wilderness for personal growth and current data from five wilderness therapy programs.

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Wilderness Therapy Defined

Wilderness therapy is often confused with the broader field of wilderness experience programs (WEPs) aimed at the personal growth of participants, such as Outward Bound and other adventure challenge programs, or reflective experience programs, such as wilderness vision questing. Wilderness therapy programs are only a small part of the larger wilderness experience program (WEP) industry, consisting of about 40 programs compared to 500 in the larger category (Friese and others 1998). More precisely, the definition of wilderness therapy includes the careful selection of appropriate clients, based on a clinical assessment, and the creation of an individual treatment plan for each participant (Davis-Berman and Berman 1994). Individual and group therapy techniques are applied in a wilderness setting and facilitated by qualified professionals, with formal evaluative procedures used to assess the clients' progress. Wilderness therapy uses expedition-based outdoor pursuits such as backpacking, educational curricula including primitive skills such as fire making, and provides extended periods of introspective alone time for clients. Wilderness self-care and group safety are facilitated by natural consequences that help teach personal and social responsibility, and create a neutral and safe environment to apply the real and metaphoric lessons learned to the life situations with which clients are struggling.

The Emergence of Wilderness Therapy

Adolescents in the United States are very much at risk, brought on in recent years by profound cultural changes, including unstructured home environments from an increase in two-income households and one-parent families, and a media culture that bombards adolescents with images of sex, violence, and excitement. These and other cultural stimuli have contributed to the epidemic of emotional disorders in American adolescents. Four million of the 26 million adolescents between the ages of 12 and 19 have emotional problems severe enough to require treatment, with a Center for Disease Control study indicating that one out of 12 high school students attempted suicide in the year preceding the study (Davis-Berman and Berman 1994). These disturbing statistics are consistent with the estimate that between 70 and 80 percent of the children with clinical mental disorders may not be getting the mental services they need (Tuma 1989).

Not enough mental health services are available that are suited for adolescents' unique needs. There is a lack of middle ground between outpatient services, which may be inadequate and to which adolescents are often unlikely to commit, and inpatient programs that may be overly restrictive (Tuma 1989). Wilderness therapy is helping bridge the gap between these extremes, its appeal strengthened by a growing reputation for economy and therapeutic effectiveness when compared with other mental health services.

Current Status of the Wilderness Therapy Industry

Data about the wilderness therapy industry are scarce, but recent surveys provide a basis for estimating the number of wilderness therapy programs currently operating. Friese (1996) identified 500 wilderness experience programs (WEPs), defined as organizations that conduct outdoor programs in wilderness or comparable lands for purposes of personal growth, therapy, rehabilitation, education or leadership, and organizational development. Thirty programs fitting the definition of wilderness therapy were identified in this survey. Subsequently, Carpenter (1998) identified six additional wilderness therapy programs beyond these, and Crisp (1996) identified two more expedition-based United States wilderness therapy programs not identified by Friese or Carpenter. Thus, a minimum of 38 wilderness therapy programs have been identified in the United States, with perhaps a few additional programs missed in these three surveys.

Cooley (1998) estimates that approximately 10,000 adolescents are being served by wilderness treatment on an annual basis, generating 330,000 user days and $60 million in annual revenue. In the following, we present data from five wilderness therapy programs that illustrate the vitality, relative size, and potential resource use of wilderness therapy. While these programs are not a random sample, it is interesting to generalize them as if they represented the 38 wilderness therapy programs identified by Friese (1996), Crisp (1996), and Carpenter (1998). Because our data represent a spectrum of programs in size, ranging from 200 to 500 clients served annually, they resemble an adequate profile, and allow a data-based assessment of the industry. In fact, these data are a conservative estimate due to a high probability that there are additional programs not identified by the previously mentioned surveys, and because these data only include those programs that are expedition-based—there are additional programs using wilderness therapy principles but operating from a base-camp model.

Our data indicate that all five programs grew in clients served from 1997 to 1998, with three of the five increasing the number of trips they offered (table 1). Wilderness field days (wfd) were calculated by multiplying clients served by the length of the wilderness trip phase of the program, generating approximately 44,775 wfd in 1997, and 51, 590 wfd in 1998 for the five programs. If we extrapolate the data as if they represented the 38 known programs, a suggested total of 11,600 clients were served in 1997 and 12,005 in 1998, generating 340,290 wfd in 1997 and 392,000 wfd in 1998, and generating annual gross revenues of $128 million dollars in 1997 and $143 million dollars in 1998 (table 2). Until data from more detailed studies of the industry are available, we believe these estimates offer the clearest picture of the current status of the wilderness therapy industry (note how close estimates of clients and user days are to those made by Cooley (1998), an experienced leader in the industry).

Given reasonable support from federal land management, medical insurance, social service agencies, and juvenile authorities, wilderness therapy should continue to grow as a positive intervention and treatment for adolescents with problem behaviors, and who may also be struggling with drug and alcohol addictions. While wilderness therapy is expensive, our data indicate that clients at some programs are receiving co-pay medical insurance assistance ranging from 0 to 60 percent, depending on the program (table 2).

Wilderness Therapy Clients

A typical participant in a wilderness therapy program is described in the literature as a juvenile delinquent, a sociopathic character, or an anti-social personality (McCord 1995). Another profile from the literature describes wilderness therapy clients as "males between 13 and 15 years of age with a history of abuse and neglect, a history of theft, truancy, drug use, arson, vandalism, assault, promiscuity; intensely physical behavior characterized by impulsivity, recklessness, destructiveness, and aggression; relatively weak verbal skills; and interpersonal relationships based not on mutual trust but on manipulation and exploitation" (Marx 1988).

Table 1—Program length, number of trips, clients served, and wilderness user days of five wilderness therapy programs.

		Number of trips		Clients served		Wilderness field days	
Program name	**Program length**	**1997**	**1998**	**1997**	**1998**	**1997**	**1998**
	days						
Anasazi	56	27	27	187	200	10,472	11,200
Ascent	42	42	43	329	375	3,472	5,250
Aspen Achievement Academy	53	75	75	300	350	15,900	18,550
Catherine Freer Wilderness Therapy	21	43	45	256	300	5,376	6,300
SUWS	21	72	75	455	490	9,555	10,290
Totals	38 (average)	259	265	1,527	1,715	44,775	51,590

Table 2—Total staff, cost of treatment, percent using insurance co-pay, and post-treatment placement of five wilderness therapy programs.[a]

Program	Total staff	Wilderness treatment cost	Clients with insurance co-pay	Aftercare placement
Anasazi	60	$15,000 ($270/day)	60% all or partial 40% private	90% return home 10% aftercare placement
Ascent	80	$18,500 ($440/day)	30% all or partial 70% private	20% return home 80% aftercare placement
Aspen Achievement Academy	65	$15,700 ($300/day)	40% all or partial 60% private	50% return home 50% aftercare placement
Catherine Freer Wilderness Therapy	40	$5,850 ($280/day)	65% all or partial 35% private	65% return home 35% aftercare placement
SUWS	58	$6,750 ($320/day)	0% all or partial 100 % private	40% return home 60% aftercare placement

[a]From knowledgable estimates by executives in each program in telephone interviews by Keith Russell, October 1998.

McCord (1995) surveyed clients over a 2-year period using the Minnesota Multiphasic Personality Inventory (MMPI) personality scale and identified three types of participants with the following characteristics:

1. The Nonconformist: Likely to be chronically angry and resentful. Tends to be passive aggressive but may act out on occasion. Immature and narcissistic, defies convention through dress and behavior.
2. The Party Animal: Often in trouble with parents and other authorities because of stereotypical delinquent behaviors: drug and alcohol abuse, sneaking out at night, early sexual experimentation. Energetic and highly extroverted.
3. Emotionally Disturbed: The group feeling the most subjective distress, including feelings of depression and despair, confusion, and dismay. Their behavior tends to be erratic, unpredictable, and highly impulsive. Poor achievement and substance abuse is common.

According to interviews with key staff in programs we are studying, typical clientele are adolescents, up to 70 percent male with drug and alcohol related diagnoses, and range from 14 to 18 years of age. Based on social history profiles and initial assessment by clinical staff, diagnoses are made using the "Diagnostic and Statistical Manual of Mental Disorder - 4th Edition" or DSM-IV (American Psychiatric Association 1994) to determine medical insurance eligibility and to help guide development of a treatment plan. Typical diagnoses include drug and alcohol abuse, anti-social behavior, conduct disorder, and depression. Contrary to what one might expect given the substantial cost of treatment, many clients come from middle-class backgrounds, with parents sometimes refinancing their homes or taking out loans to pay for treatment (Cooley 1998).

Wilderness Therapy Phases and Primary Goals

Wilderness therapy is being increasingly used as a last resort intervention for adolescents who are in serious trouble due to alcohol and drug use, sexual promiscuity, trouble with the law, and intense parental conflict. Phone calls of inquiry taken by admissions personnel commonly deal with parents who are in crisis, and in many cases, literally fear for the adolescent's life. As a director of one program put it, "in many cases, we are literally reaching under water and grabbing the hand of a drowning victim" (Paul Smith, personal communication). Thus, a high proportion of wilderness therapy admissions occur with a great sense of urgency to intervene before the adolescent self-destructs or moves into more serious problem behaviors as an adult.

Three phases of wilderness therapy are also primary goals for treatment and are defined as: (1) a cleansing phase, which occurs early in the program; (2) a personal and social responsibility phase, a particular emphasis once the cleansing phase is well underway or complete; and (3) transition and aftercare phase.

Cleansing Phase

The initial goal of wilderness treatment is to rid clients of chemical dependencies by removing them from the destructive environments that perpetuated their addictions. The cleansing is accomplished with a minimal but healthy diet, intense physical exercise, and the teaching of basic survival and self-care skills. The clients are also removed from the trappings of their former environment, including numerous distractions of adolescent culture. The cleansing process is in itself therapeutic and prepares the client for more in-depth work later in the program.

Personal and Social Responsibility Phase

After the initial cleansing phase, natural consequences and peer interaction are strong therapeutic influences helping clients to learn and accept personal and social responsibility. Self-care and personal responsibility are facilitated by natural consequences in wilderness, not by authority figures, whom troubled adolescents are prone to resist. If they choose not to set up a tarp and it rains, the clients get wet, and there is no one to blame but themselves. If they do not want to make a fire or do not learn to start fires with a bow drill or flint, they will eat raw oats instead of cooked. A goal is to help clients generalize metaphors of self-care and natural consequences to real life, often a difficult task for

adolescents. For example, adolescents may look at counselors and laugh when told "Stay in school and it will help you get a job." These long-term, cause-and-effect relationships are made more cogent when therapists and wilderness guides point out the personal and interpersonal dynamics of the clients' wilderness therapy experience to their lives.

There is strong evidence that social skill deficiencies are related to disruptive and anti-social behavior, which limits abilities to form close personal relationships (Mathur and Rutherford 1994). Thus, delinquent behavior may be a manifestation of social skill deficits that can be changed by teaching appropriate social behaviors. Wilderness therapy takes place in very intense social units (usually six clients and three leaders) with wilderness living conditions, making cooperation and communication essential for safety and comfort. Proper ways to manage anger, share emotions, and process interpersonal issues within the group are modeled and practiced in a neutral and safe environment. Thus, wilderness therapy provides hands-on teaching in personal and social responsibility, with modeling and practice of appropriate social skills and cooperative behaviors, all reinforced by logical and natural consequences from the wilderness conditions.

Transition and Aftercare Phase

Upon completion of the wilderness therapy program, clients must implement their newly learned self-care and personal and social responsibility to either home or a structured aftercare placement. Preparation for this challenge is facilitated by therapists through intense one-on-one and group sessions with peers. If a goal for a client was to "communicate better with parents," the therapist helps them develop strategies to accomplish this goal. If abstaining from drugs and alcohol is a goal, then the therapist will work with the client to develop a behavior contract and strategy with clear expectations, including weekly visits to Alcoholic Anonymous (AA) meetings, and reinforced by regular outpatient counseling sessions. In the five programs we studied (table 2), up to 80 percent of the clients may go to post-wilderness therapy placement in a structured aftercare setting, such as a residential mental health facility, drug and alcohol treatment center, or an emotional growth boarding school. Followup outpatient counseling is recommended for virtually all clients. Thus, while providing for effective intervention, diagnosis, and initial treatment, wilderness therapy is not a stand-alone cure.

Wilderness Therapy Theoretical Foundations and Applications

Wilderness treatment is generally guided by a "family systems" perspective (Satir 1967), which incorporates into treatment the family or social system from which the client came. This is a departure from the widely known "hoods-in-the-woods" programs that view the problem behavior of adolescents as the main focus of therapy. Many wilderness therapy programs will not accept a client unless parents state they are willing to be actively involved in the therapeutic process. This means that the parents themselves will be involved in outside therapy while the client is participating in the wilderness program, trying to understand how their interactions and relationship with their child relate to problem behaviors.

Most wilderness therapy programs recognize that parents contribute to adolescent dysfunctional behavior, and that without parent counseling, the positive outcomes of treatment could quickly fade if the client returns to a dysfunctional home environment. Wilderness therapy trips are designed to simulate family living, as all clients learn and practice self-care and personal responsibility, effective peer interaction, and are led by wilderness guides and therapists modeling effective adult communication and parenting skills.

Application of the wilderness therapy process is decisively shaped by the length of the program, resulting in two distinct logistical arrangements that we describe as: (1) contained wilderness therapy systems; and (2) continuous flow wilderness therapy systems, referring to whether clients are rotated in and out of programs in process. Each of these systems will be reviewed and followed by a description of a typical wilderness therapy program process.

Applications in Contained and Continuous Flow Wilderness Therapy Systems

Contained wilderness therapy programs are usually up to 3 weeks long and operate in a wilderness expedition model in which clients and leaders stay together for the duration of the trip. The group is self-sufficient in their wilderness living and hiking, and are staffed with a Masters level licensed therapist, a wilderness guide, and an assistant wilderness guide. Ratios of one staff to two clients is becoming an accepted industry standard.

Depending on the program and the process, a medical diagnosis is made by a supervising therapist for each client and labeled according to the DSM-IV criteria. Staff are briefed as to the social history, behavioral, and clinical issues of each client, where ideas and concerns are shared with staff members about desirable intervention strategies, and an initial treatment plan is developed with goals and outcomes for each client. Then the group, led by the wilderness guide, licensed therapist, and assistant guide, leave on a wilderness trip for up to 3 weeks in length.

Continuous-flow programs are longer, up to 8 weeks in length, and have leaders rotating in and out of the field—8 days on and 6 days off is a typical rotation for staff. Clients are continually entering and leaving the program as new "intakes" are brought to existing treatment groups to replace "graduates," who are leaving treatment after having met their goals. When new clients arrive, they go through an intake process of physicals and discussions with the clinical staff, and are outfitted with equipment and driven to the trailhead to meet with an ongoing treatment group. The typical intake will admit up to eight students at a time and spread the clients out over two or three ongoing groups in the field.

The groups will welcome new members and introduce themselves using an established format, and discuss any issues of importance about how the group operates. Those clients who are further along in their treatment assume roles of responsibility and are looked up to by the new clients. The peer role modeling and mentoring process begins almost immediately, as staff take a back seat to the more experienced clients who facilitate many of the lessons that need to

be taught for the new clients to survive in this harsh and new environment.

Wilderness guides, not licensed therapists, are with the clients in the field on a daily basis. Therapists are assigned to a group of clients and visit them weekly, going to the field during group lay-over days and conducting 1-to-2-hour sessions with each client discussing issues, processing their homework for the week, or relaying information from parents. After the session is over, the therapist will give the client an assignment to complete for the week, such as bringing up a certain issue with the group and observing the reactions of the other group members. A structured group therapy session is then facilitated, often guided by a metaphoric lesson or a psycho-educational topic for the week.

Typical Wilderness Therapy Process

After the initial shock of the dramatic change in environment, clients begin to display behavior patterns consistent with their social history profiles. Staff routinely meet and discuss treatment strategies, such as increased responsibility for a client who lacks self esteem, or suggesting that a client who is having trouble expressing themselves bring up personal issues in group sessions.

Individual one-on-one counseling sessions are coupled with intermittent group counseling throughout the trip. The individual counseling sessions can take place on the trail, in a client's shelter area, or while whittling sticks when making a bow-drill fire set. This neutral environment and unorthodox approach eliminates many of the barriers associated with traditional therapeutic counseling, such as intimidation by the therapist or the stigma of going to a "hospital" because they are "sick." In a wilderness setting the therapist can be seen as a person and not as a threatening authority figure. Therapists work on establishing rapport with the client, earning their trust, and doing initial assessment of the underlying issues. Lessons learned in these impromptu "sessions" are relayed to other field staff and documented in daily and weekly treatment notes.

Group sessions are held at least daily and range from being loosely organized, where the clients direct the flow of discussion, or extremely structured, where a reading will be presented and the group will focus on its direct meaning. The goal of the group session is to provide clients an opportunity to share feelings and emotions that have begun to emerge in the course of treatment. Groups play a valuable role in allowing students a safe and controlled environment to practice some of the new interpersonal skills they are learning and hear the stories of other clients. The feeling of group cohesion that develops through these candid interactions is of major therapeutic value for clients, virtually all of whom feel alienated from well-adjusted peers due to their dysfunctional behavior and problems.

As the trip continues, calls will be made via cell phone or radio back to base camp to communicate with therapeutic staff working directly with the client's parents. Needless to say, parents are experiencing considerable anxiety, guilt, and regret that their children are being put through this experience and often blame themselves for their children's problems. Parents may also be in counseling and beginning to realize that they may be part of the problem and also need to change. The field staff encourages the adolescents to write their parents and express their feelings about the past and describe changes they want to make at home to help foster a better family environment. Parents may need help from therapists in understanding the sometimes negative and blaming tone of these letters. Thus, the parents become part of and invested in the therapeutic process and are kept aware of the progress their child is making.

As the wilderness therapy program unfolds, decisions are made as to the necessary follow-up care for the client, and an aftercare treatment strategy is developed. In some cases, 3-week programs are used primarily for diagnosis and assessment, cleansing, and stabilizing the client to prepare them for placement into an aftercare facility such as a boarding school, drug and alcohol treatment center, or residential psychiatric facility (table 2). Depending on the seriousness of the client's issues, 8-week programs may also serve this purpose, although more clients return to families than go on to aftercare in the 8-week programs for which we have data (table 2).

A recommendation for aftercare treatment can be shocking and unexpected for the client because in many cases they believed that all they had to do was complete the program and they would be allowed to go home and see their friends. The therapists and wilderness guides work with the client in intense one-on-one sessions to help them see and accept that the recommended aftercare is the best move for them, given the circumstances of their past behavior. Experience confirms that in most cases, unless assessments and recommendation growing out of wilderness therapy are followed, clients may quickly revert to prior behavioral patterns of resistance.

As the wilderness program draws to a conclusion, the focus is on generalizing the lessons learned and preparing clients for their next step in the recommended continuum of care. Clients are busy working on journal assignments, preparing word-for-word what they want to say to their parents, and completing necessary tasks such as educational curriculum or a primitive skill checklist, to assure that they will graduate on time. After 2 to several weeks in the field, living and traveling in the wilderness is as second nature to clients as grabbing the remote control and turning on the television. The focus is now on their personal issues and how they plan to tell their parents, therapists, or the aftercare facility that they have indeed learned something, want to change for the better, and have an action plan to do so while staying clean and sober from drugs and alcohol. If the program has worked, the meeting with parents is emotional and frightening and the first step in the right direction to making better choices and improving relationships with family.

Implications for Wilderness Management

Though the value of wilderness to mental health has been extolled for decades, mental health institutions and medical insurance companies are just now beginning to embrace wilderness therapy as an effective intervention and treatment for adolescents with problem behaviors. Parents by the thousands, desperate to save their adolescents from self-destructive behavior and drugs and alcohol, continue to turn

to wilderness therapy. Our data suggests that these trends and pressures are leading to significant wilderness use, 392,000 user days or more per year by 38 known wilderness therapy programs, in an enterprise collectively generating at least $143 million dollars annually. We see at least three primary wilderness management implications from these trends.

Wilderness Therapy Is a Growing Wilderness Use

Our data indicate a substantial and growing amount of wilderness use from at least 38 wilderness therapy programs, which is but a small part of the much larger wilderness experience program (WEP) industry that includes 500 WEPs. Wilderness managers recognize these increases; Gager and others (1998) found in a national survey that virtually all wilderness managers perceived increases of WEP use in areas they administered.

A key issue is whether or not WEP use, including wilderness therapy, depends on designated wilderness to meet their goals. Gager and others (1998) found that a majority of wilderness managers believe that wilderness therapy program activities are "not" wilderness dependent, but two recent surveys of WEPs revealed that more than half the respondents say they operate in designated wilderness (Friese 1996) and regard their programs as depending on wilderness (Dawson and others 1998). Manager fears of WEPs identified by Gager and others (1998) include establishing new trails, overuse in areas already saturated, site impacts, large group size, lack of wilderness stewardship skills and knowledge, and conflicts with other users.

Demand for wilderness use may soon overwhelm the capacities established by managers and raises difficult questions. Can we, or should we, lower standards for naturalness and solitude? Can enough new areas be brought into the wilderness system to expand capacity? Is the use of wilderness for personal growth and healing of young people more important from a social and economic standpoint than commercial recreation use or casual use by the public?

Wilderness Therapy Has Unique Impacts on Wilderness

The use of primitive skills as a wilderness therapy tool may expand normal impacts of wilderness use, and in some places adjustments may be needed. For example, if 10 clients make two fires a day for 36 days it would equal 720 fires throughout the course of one program! Already aware of these potential impacts, many programs have begun self regulating the use of fire, striving to maintain its therapeutic value while conserving the resource. For example, the Anasazi program, which often operates on the Tonto National Forest in Arizona, now uses primitive methods to ignite a coal, which is then used to light propane stoves for cooking. This reduces fire scars, depletion of fuel wood, and other impacts. Catherine Freer Wilderness Therapy, which often operates in the Kalmiopsis Wilderness Area in Oregon, also uses primitive fire making in structured lessons in preestablished areas, but cooks over gas stoves to lessen their impacts.

Strengthen Communication and Cooperation

Enhanced communication and cooperation is needed between agency managers and wilderness therapy leaders to coordinate use and address impacts with new strategies. For example, work projects might be completed by wilderness therapy programs with therapeutic effects for participants, crowded areas can be avoided during peak times, and strict leave-no-trace principles can be practiced.

Better communication would also help close the gap in understanding between what are necessary and desirable practices for the benefit of wilderness. This a concern for wilderness therapy programs because they need wilderness to operate, as well as for wilderness managers who are mandated to protect the ecological integrity of wilderness. A strengthened relationship would help deal with misperceptions about wilderness therapy, minimize impacts on wilderness, and maximize benefits from wilderness therapy as a positive intervention in the lives of troubled adolescents.

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Outward Bound Learning: A Pilgrimage for Personal Effectiveness (Indian Experience)

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Abstract—The aim of this paper is to share an experience in India that can stimulate interest among wilderness enthusiasts about latent learning opportunities for personal growth, attitudinal change, team building, strategic planning, and systems thinking using Outward Bound experiences.

A sustainable future presupposes that we do not repeat the mistakes of the past. Every human endeavor and every opportunity of human and material investment has to be relevant to the long term. Greater appreciation and sensitivity to the future impact of everything we do or refrain from doing is emerging as the neo-consciousness. Critical examination of the imprints of historical memory and the fields that influence structures and behavior fractals has been used by mankind to discover the mysteries of nature and how migrant tribes could adapt their lives. Such collaborative explorations between the human and nature is the key foundation to ensure a sustainable future.

In such a backdrop, two leading institutions in management training and organization consulting from Bangalore, the Pegasus HRD Centre and the Group for Institution Development, have been collaborating to orient Outward Bound Training to facilitate Outward Bound Learning. The joint venture has set up a facility in the rural and wilderness surroundings near Bangalore to simulate situations modeling organizational and life realities. Their design of exercises and feedback mechanisms encourage personal growth, teamwork, leadership, and in special cases, insights into organization development. During a short period of less than 1 year, they have evolved models and modules of Outward Bound Learning that give importance to learning outcomes. However, there are variations that focus on building skills to survive in the wilderness.

Presented in this paper is the explanation of steps adopted by these institutions, such as deep reflection, rigorous consultation on program design, and responsive listening to specific needs of human development of client organizations. The authors have facilitated eight programs called Outward Bound Learning modules in collaboration with their respective teams. They are in the process of arriving at tentative working hypotheses about personal growth, team efforts, and group development that can be taken further for testing and validation by networking groups and researchers.

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Pilgrimage: Wilderness Learning in Indian Traditions

During festive seasons in India, pilgrims throng to many ancient hill temples, be it Manasarover in the Himalayan range or the Ayyappa devotees queuing along the rain forests of Kerala. The Hindus choose the wilderness route for ritualistic prayer and meditation to seek salvation. Rural folk, especially the farming communities, trek several miles with their families carrying rations to distant places of worship for thanksgiving and celebration. For ages, the belief persists that physical exertion and pain, and living together in strange settings among strangers, will help to overcome biases, resistances, prejudices, and induce compassion, empathy, and tolerance to manage differences.

Indians have always acknowledged the teacher in nature. In all its manifestations and dimensions there remains a dynamism of sorts. Be it the snow-peaked or rocky, rain or brown-forested, mountains have fascinated people of the world. The Dravidian anthropology classified people as (1) those who live near the sea shore, (2) those who live in the mountain valleys, (3) those who live along the river banks (4) those who live in farm lands and plains, and (5) those who live in the deserts the jungles. These nature-based societies have their own distinct cultures, temple architecture, farming practices, and festivals for celebration and developed psychographic qualities to survive in their own settings.

Nature is psychedelic in its diversity. The oceans and the sky, for example, look differently in the morning, at noon, and the evenings. The moonlit night is different from the dark, clear, or cloudy skies. The colors vary from season to season, bringing in its wake the signals of caution, surprise, and celebration. Tidal waves and tornadoes are devastating while the monsoon and the gentle breezes are friendly, healthy, and encourage procreation.

The Rural Indian is inward-looking and has always learned through the oral traditions. Looking within they found that human nature is as diverse and dangerous as global nature. Feelings, emotions, beliefs, and apprehensions are as much a part of us as the animal world. Living with and in nature, succumbing to the vicissitudes, has helped mankind realize the truth behind the holism of man-nature nexus.

Any pursuit to explore the unknown parts of nature entails a certain amount of risk. The more hazardous the pursuit the more pressure it exerts. Such pursuits expose the good and the not-so-good alike. However much we

succeed in hiding the ugly wedges of our character, the handicaps and our wickedness under the veil of sophistication and politeness, our true and authentic being will come out when we are in the wilderness.

The Indian mythology is rife with stories that abound with examples of learning from the wilderness. When we interpret the Hindu Mythology, we notice the importance attached to learning and growth in or through wilderness. The characters of the epics like Mahabaratha and Ramayana learned the nuances of governance, skill of martial arts, and the strategy of waging and winning wars by living in the forests and being away from their kingly palaces.

Wilderness seems to have taught them balanced judgements, objectivity with empathy, compassion, and fairness. The examples of interpersonal sensitivity, personal values, shared vision, steadfastness of purpose, astuteness, and managing personal pride are a true testimony of what life in the wilderness has taught these characters in the epics. The parents, guardians, and gurus of the heroes and heroines were repositories of wisdom fully appreciating the value and sustainability of experiential learning from the wilderness.

Young Krishna was sent to a wilderness school: "Sandeepani" and Rama with his brother were consigned to the forest under the tutelage of a Guru called Viswamitra. In the case of "Pandavas," 13 years of wandering in the wilderness taught them the art of winning a war. There are ample quotations to cite their deeper learning about the differences between knowledge, virtue, competence, and wisdom.

Genesis of the Pegasus Centre and the GRID Society

Three officers from the defense services joined hands to give form to a shared vision. The founder, Capt S. Ravi (Retd), a paratrooper while in service, Gp Capt P. Venugopal (Retd), with laurels of an adventure-sport expert and mountaineering instructor, and Maj Gen V. Uberoy, who after years of experience in defense management obtained a Doctorate in International Affairs and created an infrastructure at Pegasus HRD Centre for career counseling and selection into the defense services and training of police and security personnel. Today, the Centre is a full-fledged facility for skill training in outward bound and learning about personal growth and team building.

Set among rugged hillocks, farm fields, and a salubrious valley, Pegasus HRD Centre (or "camp" as it is known among village folks) has the ambience of a resort and the makings of a school of learning. A lake with perennial water throughout the year is used for water sport experiments. The hillocks are high enough to practice paragliding.

Concurrently, another organization in Bangalore called the GRID society, promoted by a team of consultants in behavior science and organization development, was searching for a partnering organization to experiment linkages of Outward Bound Training with laboratory methods of learning. Laboratory method is also known in India as process-based learning or 'T' group learning.

Most of the GRID consultants are qualified through ISABS and other Institutes such as the Tavistock Institute in London and the NTL Institute in Bethel, Maine, U.S.A., and are, therefore, specialists in behavior and learning aspects of "self" groups and organizations.

Defense Training and 'T' Group Training Models

World War I necessitated the development of tests that would be administered to groups of 30 to 50 persons at a time. Paper-and-pencil tests were meant for measurement of intelligence and aptitude, and also for assessment of some aspects of personality. However, psychological testing has certain limitations such as overproductivity, lack of comprehensive coverage, overemphasis on test results, invasion of privacy, and low validity.

World War II witnessed the development of situational tests for personality assessment for military leadership roles. Situational tests called for individuals to solve specific problems by actual participation along with other members of a group rather than hypothetical paper solutions. A situational test forces an examinee in a situation to closely simulate a "real life situation."

Situation-stress tests differ from the situational tests in that an element of anxiety is introduced into the situation. The given interaction releases considerable dynamic forces from each participating member and subjects the individual's performance to the field of social forces, testing one's ability and tolerance to frustration.

Three kinds of situational tests hold good even today in training of defense personnel for group effectiveness:

1. Tests involving a leaderless group where a task is assigned that requires cooperative efforts.
2. Leaderless group discussions where a group is assigned a topic for discussion during a specific period.
3. Tests that employ role playing to obtain a sample of interpersonal, job-relevance behaviors.

The group-testing technique consists of a number of different leaderless group situation in which the participants have the freedom to choose their own behavioral roles, lay down their own priorities for action, and engage themselves in collective group activity. Interacting freely, they bring about modification and changes in their own and others' behaviors based on assessment of behavior in the group task.

Group effectiveness can be assessed at three levels:

1. Effective functioning—Ability to contribute to the common task by planning and organizing available resources.
2. Group cohesiveness—Ability of the members of the group to relate emotionally to each other and to the task, binding the group to achieve the stated goal.
3. Stability—Ability to withstand stress without serious impairment to effective functioning and group cohesiveness (the first two levels).

The group testing technique assesses an individual in the context of an experimental group, which is submitted to a considerable physical and mental stress. From this, one seeks to observe and evaluate an individual's group effectiveness, which is the individual's total contribution to the group and to the task. However, while group exercises, such as the "group dynamic-obstacle course," promote interplay

and interaction of a group to facilitate the assessment of the individual, they inhibit interactions at the time of testing performance.

This approach emphasizes the need to study the static pattern of individuals and to analyze and interpret the dynamics of inter-relationships. The conscious appreciation of a situation and the ability to adjust to the dynamics and cope with the stress are observed, and feedback is given. This widened concept of studying personality, therefore, concerns itself with a person interacting continuously within the environmental group where that person may influence others or be influenced by others.

Thus, if one can control the stresses to which a small group is submitted, one can hope to provide its members opportunities for leadership and for conditions that open creative options. From the ability of a person to take advantage of these opportunities and to adjust to the constraining conditions, it is possible to draw tentative estimates of the person's ability and of the person's creativity blocks.

In addition, simple psychological tests like the 16PF, when administered to individual participants, facilitate reflection on the feedback of the evaluators. Participants can reflect into their own life patterns to capture trends in behavior and risk taking. The presence of a trained counselor has enabled consultation to interpret the test scores with the feedback and actual experiencing of the tests.

The principles of group evaluation have been based on the following principles:

1. Gestalt—"An organized whole" integration of each part inter-linked with each other and with the whole.
2. Social field theory—Inhibiting and enabling forces in any social field that either helps or hinders development.
3. Consistency—Nature of reaction to change in situations causing stress.
4. Group development—The dynamics of members in any group asserting their styles on task or maintenance roles.
5. Sociometry—Group and individual versus individual preferences.

While defense training focuses on hard skills of negotiating physical obstacles, 'T' group or sensitivity training addresses needs of soft skills that promote reflection about behavior of self and others' attitudes and communication blocks. 'T' group method or experiential learning was developed in the United States after the war along with the Tavistock clinic in England to facilitate personal growth while working in groups. The structure for learning is open-ended, and discussions are initiated without any fixed agenda. The focus of interventions and feedback is more in the process of "how" participants interact and behave than in the contents or the knowledge that is being shared.

The dynamics in such groups help to discover strengths, styles, and perception gaps. The data generated then-and-there in the group setting become a factor and a variable that influence the members to learn about themselves. Experience shows that members become aware of their patterns of behavior and of their impact on self and others. The laboratory approach offers scope for experimenting and testing new behavior and seeks confirmation from others on their perceived levels of satisfaction. These laboratories are generally effective with total strangers. Careful facilitation to resolve all the residual interpersonal issues generated during the life of the group is an important responsibility of the Trainer.

As has been the experience with other adventure training participants in the West, the members begin to realize that many of the limitations are self-imposed. The idea of Outward Bound Learning is to expand the sense of competence through structured outward bound exercises.

Theoretical Bases for Outward Bound Learning

The bases for the design of Outward Bound Learning modules that have been developed and tested by Pegasus/GRID teams do not confine to their respective personal theories. What is meant is the personal theories of Outward Bound Training held by Pegasus and those of 'T' groups held by GRID have given rise to a local theory for Outward Bound Learning. Pegasus playing the role of the Outward Bound coach and GRID playing the role of a mentor for learning are now the preferred and accepted norm. Pegasus coaches and GRID mentors are in the process of acquiring mutual skills.

The rationale for this collaboration is the belief that whatever the facilitator/trainer expects to happen with a participant group must have happened between them; for example, the Team working between GRID and Pegasus is a (sine-quo-non) for team building to happen during Outward Bound Learning. Similarly, whatever physical obstacle or wilderness terrain that is designed for participants should have been negotiated by the facilitating team. At a concept level, the meaning of terms used between coach and mentor have to be commonly agreed upon, such as:

Team = A group of persons agreeing to work toward a common goal.

Competence = Ability to compete in equal opportunity situations.

Skills = Ability to apply relevant knowledge with speed.

Attitude = Ability to honor the sensitivities of self and others while responding.

Personal Growth is visualized to occur during Outward Bound Learning in sequential steps starting from the present self-concept of the participants. This process may or may not take place in actual life during an extended period of years. In Outward Bound Learning, the situations are simulated to generate the experiences essential for personal growth to take place and, therefore, to accelerate the process of personal growth leading to personal effectiveness (fig. 1).

The concept of the adult learning cycle/experiential learning cycle developed by David Kolb and Donald Fry (U.S.A.) suggests four steps through which the cycle of learning continues:

1. AE—Active experimentation with the exercises and structures offered in the Outward Bound Learning Module.
2. CE—Concrete experiencing of the actions, emotions, and blocks while going about the tests and experiments (treks, etc.).
3. RO—Reflective observation about the CE and the feedback received.
4. AC—Abstract conceptualization—gaining insights and new meanings about self, ego, need for change, and

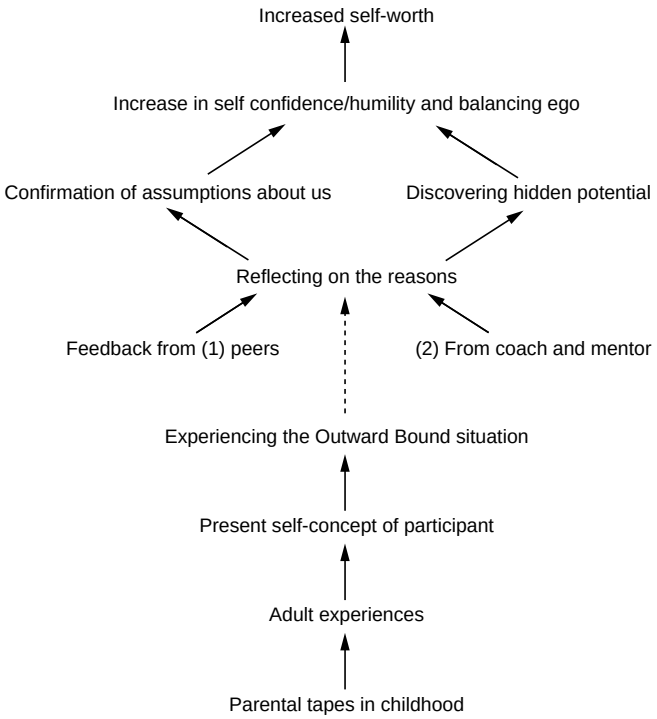

Figure 1—Steps for personal growth.

discovering the thresholds one can cross with confidence levels leading to new self worth.

The operating paradigm of the Outward Bound Learning module is the belief that the basic aspiration of every human is to struggle through life to "become" the person he/she wants to be; the whole idea of blossoming (Carl Rogers) and the formula for design is the Action Learning Cycle.

Action Learning Cycle

Concepts learned from each activity are progressively carried on to the next exercise. In Outward Bound Learning, learning is accompanied by fun and excitement and, therefore, is less painful. Reflection is an important step to internalize learning from the experience of action. The transformation is from Self 1 to Self 2—growing through the action learning cycle which denotes personal growth.

Feedback is used as a strategy to enhance personal growth. The purpose of the feedback is to expand self-awareness as in the JOHARI window model seeking help of others. Importance is given to the non-judgmental nature of the feedback, which stimulates reflection and self-discovery and increases the willingness to change.

As for the coach and mentor team who facilitate learning in Outward Bound Learning modules, the qualities of "Guru" have to be imbibed and demonstrated:

- The Guru must have concern and empathy for the wards/seekers/students (sishya).
- Both the Guru and the student are "seeking" the truth.
- The learning field is created both by the Guru and the student.
- Search is an adventure journey into the unknown outside to discover the possibilities within one's self.
- There must be total awareness of the boundary conditions between the facilitator and the participant, and in maintaining the secrecy of learning within the event.
- There must be humility to own failures in the process of learning.

Relevance of Outward Bound Learning to People and Organizations

As the world is waking up to the next millennium, corporate management in general, and the HRD movement in particular, are in the search for new training tools. Case studies and management approaches are published as paperbacks to stimulate interest in bettering and hastening change. Today one notices a great urgency to adapt anything that is packaged with a promise for change. Outward Bound Learning is one such package that is catching up in India. More than ever before, the emphasis on survival has resorted to right-sizing the pyramid and creating self-managing non-hierarchical groups, moving to flatter structures. The overwhelming importance of teamwork and teambuilding along with individual excellence is seen as the ideal combination sought by the IT industry. The question is: How can one be a member of a high-performing competent team without competing with each other for individual recognition?

The demands for HRD vary with different organizations in different sectors. With intermittent and unpredictable changes in market environment, organizations are unable to hold to a job description and a structure for more than 3 years. In such a fluid context and in an employment market that is historically known for lifetime jobs and job security, taking risks calls for special nerve and vision at the individual and the organization level. More and more, preference is for those who can operate in leaderless self-managing teams.

Every team requires a combination of talents and skills balanced for team success. Due to factors beyond our comprehension, each one of us posseses special tenets that lie undiscovered. How many of us are aware of the natural ease to become a resource mobilizer, contingency planner, quality assurer, documentor, coordinator, and so forth, which are not exclusively leadership traits. The simulated exercises of the Outward Bound Learning module offer a scope for these natural and psychographic characteristics to surface. The case study presented later in this paper shows the design aspects of the Outward Bound Learning module to suit the learning agenda of the team or department who sent their members to participate.

The relevance of Outward Bound Learning is reinforced when we look at the specific learning objectives declared by organizations who send their members to the modules. For example:

Organization "X" wanted to:

1. Prepare mindsets to discover ways of working together beyond functional and departmental boundaries and beyond fields of specialization.

2. Create awareness about the impact of manufacturing cost due to unconscious factors resulting in wastage of time and re-work.

3. Introduce the importance of multi-skilling.

4. Enable members to discover their hidden potential to take initiative and risk, and to communicate and build a team.

Organization "Y" wanted to:

1. Resolve the identity crisis faced by persons of a department who worked in different geographical locations with other divisions that had their own bottom-line priorities.

2. Reduce the attempts to reinvent the wheel by improving the communication internally within a group that worked in one location.

There are propensities creeping into organizational life without conscious motives being visible. To manage anxiety and to overcome work stress, people resort to games that protect their interests. Such processes result in interpersonal conflicts and communication breakdowns due to hidden agendas. Human behavior is a complex field of contradictions and congruities. Using the 'T' group process methodology, it is possible to highlight these internal unconscious processes that affect task completion of groups and that cause cost escalation and quality erosion in an organization.

Initially, working groups attempt to demonstrate their effectiveness through performance. However, members experience interpersonal stress and tend to cover up conflicts. They become "pseudo teams." When the hidden processes of power and politics are exposed and when the hidden potential of less articulate members surface, they start working toward a "real team." Such transformations of a work group to real teams has been witnessed during Outward Bound Learning experiences.

Another advantage of the Outward Bound Learning module is that the members are facilitated to get in touch with their feelings and attitudinal blocks that in their daily lives they are unable to articulate and deal with. What is ignored and overlooked surfaces, for example: disappointment, thrill, fear, extreme fear, confidence, hope, trust in others, faith in God, anger, guilt, jealousy, joy, chivalry, kindness, love, and affection.

The Outward Bound Learning module also tests the limits of human physical and psychological endurance. The participant's learning is internalized through association with outward-bound or wilderness symbols and other memorable moments with the group. A task of mountain climbing that appeared formidable due to the towering gradient, when negotiated by the group with aides from the coach and later processed by the mentor, increased their sense of self-confidence. Assumptions about one's own limitations were confronted at the self and group level. The weaknesses became imaginary when they crossed over the edge of their fears. Later, during the reflection sessions, they realized the importance of communication, asking for help, and safety of fellow members. Sometimes the myth of gender was exploded when they realized that sex differences are not a variable while carrying out Outward Bound Activities.

Limitations of Outward Bound Learning Modules

With the sudden increase in demand for Outward Bound Training, there is likely to be a proliferation of wilderness treks and Outward Bound schools. Of course India offers enormous settings for Outward Bound Training and Outward Bound Learning. Professional facilitators are limited because the ideal combination of a facility manager, wilderness coach or instructor, and a process mentor that is needed for personal growth and team building is a rarity. Moreover, there is a dearth of women instructors.

Outward Bound Training programs should not be too long because participants may experience adjustment problems when returning home. This has been true with "T" group participants also. From the authors' experience the ideal would be 3 days and 2 nights in the Outward Bound camp or facility.

Concern for participants' health has to be articulated. The facilitators should have clearance from a medical practitioner and be sensitive to latest medical history, such as fractures, allergies, and traumas. As an additional caution participants should be requested to check their insurance coverage.

Ethical professional practice demands that participants and their organizations and families be adequately apprised of the hazards and pressures of wilderness training. The Outward Bound Learning facility manager should be totally accountable for any mishap or accident during the process.

It is likely that holiday resorts that cater to entertainment and leisure needs of guests will offer wilderness training-like packages to attract customers. Organizations and HRD managers should distinguish the merits and demerits and choose the appropriate facility.

Outward Bound Learning facilities and exercises are high-investment ventures, requiring the compliance of several state and central government laws, regulations, and tax structures. Organizations need to ensure that adequate certification and licenses have been granted to the facility by the appropriate district and state level governance machinery.

Precautionary measures to protect the environment along the treks, and sensitivity to the sentiments of local people, is necessary.

Recommendations to the 6th World Wilderness Congress

Following are suggestions from the authors to the larger professional community and research scholars:

1. Include the concerted initiatives of Outward Bound Learning and Outward Bound Training from India for accreditation to International Standards of Wilderness Training.

2. Include personal growth facilitation as an important criteria for such accreditation and certification worldwide.

3. Form an international forum for Outward Bound Learning facilitator accreditation that lays down guidelines and a code of conduct for professional practice.

4. Initiate global networks to be linked on common Web and e-mail for updating experiences and exchanging discoveries, and for curriculum and client feedback.

5. Collaborate with the corporate HRD professionals around the globe to get feedback on best practices of Outward Bound Training and Outward Bound Learning.

6. Recognize an Indian Chapter for Wilderness Education and Training with a comprehensive coverage of schedules that honor the role of other related disciplines such as therapy, yoga, art, and environmental audit.

7. Start an international journal that can update and widen the knowledge base.

8. Spell out safety standards to be adhered to during wilderness training.

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The Role of University Wilderness Education in America: A Conceptual Design

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Abstract—The complexity of wilderness, as an idea and a practice, demands an interdisciplinary curriculum and innovative teaching methodology. Universities can make unique contributions to wilderness education by drawing on diverse disciplines and faculty, and innovative teaching methods. This paper examines the content and methods of wilderness education in the context of the American university and current learning theory. A conceptual framework is developed, and assessment processes proposed. An international dialogue about wilderness education and assessment of student learning outcomes can contribute to this effort.

Wilderness is a multifaceted and complex concept, a cultural construct and a biophysical reality, increasingly relevant and controversial. As such, wilderness poses certain educational challenges and opportunities. How should current and future generations learn about the elusive, yet compelling, idea of wilderness? And what role should American universities play in wilderness education? This paper builds on Western theories of learning and education to explore how desired learning outcomes might be facilitated at the university level. Perspectives on wilderness, learners, educational outcomes, and the university context are drawn into a conceptual framework. This conceptual framework is the first step toward assessment of the "Wilderness and Civilization" program at the University of Montana. The purpose of this paper is to share our discoveries and ideas with regard to wilderness studies and higher education, and to engage an international audience in a dialogue about the nature of wilderness education and the assessment of learning outcomes.

A Convergence of Resources

A university experience has unique potential—students for extended periods of time, diverse human and institutional resources, and a mission to discover and challenge. For universities to live up to their potential, they must understand learners, reflect on their own institutional capacity, be explicit about desired learning outcomes, experiment with a variety of teaching methods, and discover effective tools for assessment.

Understanding Learners

Learning begins with students, and the diverse ways that learning and knowing occur must be accounted for in the design of any effective educational program. When Howard Gardner published "Frames of Mind" in 1983, he initiated a revolution in American education. Gardner (1983, 1998) drew on cross-cultural research to identify the human intelligences:

- Linguistic
- Musical
- Logical-mathematical
- Visual-spatial
- Bodily-kinesthetic
- Intrapersonal
- Interpersonal
- Naturalist

As Gardner points out, only two of these eight intelligences, the logical-mathematical and the linguistic, are traditionally valued and assessed through American education. Others, such as bodily-kinesthetic and naturalist are rarely accessed under current systems. Gardner's illumination of the failure of the American educational system to explore the full breadth of its students' capacities initiated an effort to redesign learning environments.

Truly interdisciplinary curriculums, those that combine arts and humanities with science and management, capitalize on multiple intelligences. Varied teaching methods also access multiple ways of learning and knowing. Wilderness studies provide a plethora of opportunities for varied methods and interdisciplinary curriculums. Faculty need to value, recognize, and facilitate students' diverse capacities to nurture a broader understanding of wilderness.

The American University

The institutional context in which students learn must also be considered. American universities can bring a unique set of resources to bear on wilderness education. Universities have access to expert knowledge in a diverse set of disciplines. They also are places of discovery, innovation, and research. Thus, university-level students are uniquely situated to explore questions of ethics and personal values. Rising to the potential of wilderness education, however, requires overcoming obstacles inherent to the structure and culture of the university.

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The structure of most universities produces significant barriers to interdisciplinary education. David Orr (1994) argues that the compartmentalization of academic disciplines is a central problem in higher education. Interdisciplinary programs in a variety of fields have overcome these barriers, but many constantly struggle to retain a diverse curriculum. In addition to drawing together an eclectic mix of disciplines, wilderness is also infused with questions of values and ethics.

Universities are often resistant to the integration of values and ethics in the curriculum. In fact, a Gallup Poll entitled "Attitudes About American Colleges" (1989) found that only a third of Americans polled believed that institutions of higher education effectively prepared students to be good citizens, and only 40 percent felt that students were given adequate opportunities to explore their values. Universities can encourage faculty to incorporate values and ethics into their courses in ways that do not compromise professional "objectivity."

University faculty may be inexperienced or unfamiliar with or resistant to teaching methods that capitalize on multiple intelligences. Nevertheless, traditional lecture-style teaching methods seem to be giving way to a wider range of methodologies appropriate for specific contents and contexts. Boshier (1998) points out that rapid changes currently happening in the university system "present opportunities to practice a more engaged, participatory pedagogy." And, despite significant barriers, American universities continue to demonstrate their creative capacity by developing innovative, interdisciplinary, and environmentally-focused programs.

Desired Learning Outcomes

One of the ways that American universities are working to increase their effectiveness is through identification and assessment of student learning outcomes. Outcomes-based education is an increasing priority and emphasis in higher education. Accreditation now depends partially on a university's ability to demonstrate that tangible learning outcomes are being achieved. Distilling key learning outcomes can assist wilderness studies programs in defining and assessing their achievements.

Because students of wilderness need to become aware of and understand a varied set of facts, concepts, and contexts, a wilderness curriculum is necessarily interdisciplinary, drawing on social and biophysical sciences as well as humanities. A well-rounded student of wilderness should understand:

- Wilderness legislative history and process.
- Institutional structure and the role of agencies.
- Wilderness philosophies and values, and social history of the wilderness movement.
- Diverse strategies to effectively make change and deal with conflict.
- Basic ecology.
- Cultural and social perspectives on wilderness as expressed in literature, art, economics, anthropology, history, and sociology.

Students of wilderness also need to develop a specific set of skills and abilities. They need to be able to move from having the information or knowledge to the ability to apply this knowledge within numerous cultural and economic contexts—and on multiple spatial scales. This challenge requires the ability to synthesize practical and conceptual information and apply it to constantly changing ecological issues, management dilemmas, and decisionmaking processes. Since wilderness is relational, involving relationships between management and science, culture and economics, and individuals and the communities they are members of, students of wilderness need to be holistic thinkers. They must have the ability to see wilderness issues through multiple lenses and to integrate and synthesize between these lenses. Some combination of the following skills and abilities will assist students of wilderness in tackling wilderness challenges:

- Ability to see ecological issues from varied perspectives.
- Ability to respond in a clear, critical, sophisticated, and factual way to an environmental issue.
- Ability to communicate expressively and effectively thoughts, positions, concepts, and values.
- Observation skills.
- Development of basic backcountry skills and physical and psychological comfort in wilderness.
- Ability to make innovative conceptual and practical connections across fields and disciplines.

Because students of wilderness need to understand relationships that cross disciplines, the intersection of each of these, shown as the center in figure 1, becomes particularly important. For example, managers in the Northern Rockies are currently struggling with whether to ignite prescribed fire to restore stands of whitebark pine. Ecology, landscape architecture, recreation, fire science, or philosophy alone would provide a narrow answer to this question. Even an

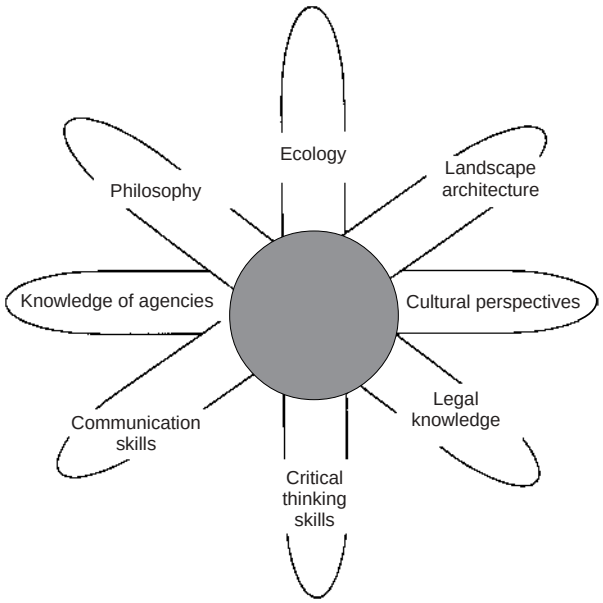

Figure 1—A subset of the connections between wilderness learning outcomes.

aggregation of these fields would provide a useful, but limited, response. Creative solutions will come rather from the dynamic integration of a diversity of disciplines and perspectives, skills, and abilities (fig. 1).

Wilderness challenges also present difficult ethical and moral dilemmas. Wilderness education programs need to offer students avenues through which to clarify and explore their personal values and ethics. Students of wilderness also need to nurture an understanding of one's values in contrast to dissimilar perspectives. Leopold (1949) aptly described a land ethic as that which:

> ...enlarges the boundaries of the community to include soils, water, plants, and animals, or collectively: the land. In short the land ethic changes the role of homo sapiens from conqueror of the land community to plain member and citizen of it. It implies respect for fellow-members, and also respect for the community as such.

Building on Bloom's (1956) conceptualization of levels of knowledge, progression through these outcomes might begin with awareness of the issues, move into knowledge and understanding, then to recognition of connections and integration of values, and finally to problem solving and effective expression (fig. 2).

Methods for Wilderness Education

Given the opportunities the university offers, the learning outcomes we desire, and our current understanding of learners, what are the appropriate methods for wilderness studies?

While some argue that "traditional methods can and do still work" (Ringe and Pelkki 1998), the "sage on the stage" lecturing method, as Boshier (1998) calls it, is waning in importance. Because lecturing is an efficient way to convey information, traditional teaching will surely retain a role in higher education. However, its dominance will likely be reduced. In the context of wilderness education, a wide variety of experiential, participatory, learner-centered methods may be indicated.

Orr (1994) proposes that because "we experience nature mostly as sights, sounds, smells, touch, and tastes—as a medley of sensations that play upon us in complex ways," education about the natural world should be similarly structured and incorporate experiential learning. Keeton and Tate (1978) define experiential education as:

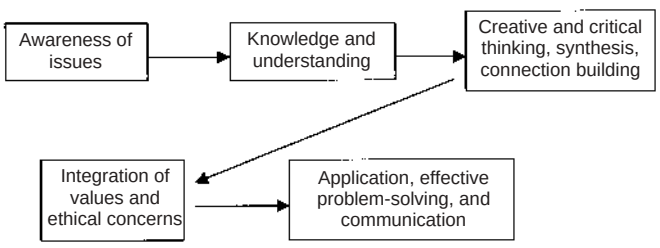

Figure 2—Potentially sequential stages of student learning.

> Experiential learning refers to learning in which the learner is directly in touch with the realities being studied. It is contrasted with learning in which the learner only reads about, hears about, talks about, or writes about these realities, but never comes into contact with them as part of the learning process.

Earlier this century, Dewey (1929) proposed that education based on experience might also combat the dualisms perpetuated by Western society. Dewey focused specifically on the dualism between humans and nature. Because the American conception of wilderness is inherently dualistic, experiential education is a particularly useful tool in the critical analysis of the wilderness idea. Building on nearly a century of work on the benefits of experiential education, advances in learning theory continue to support the notion that concepts must be applied or experienced to be best understood and retained. With regard to wilderness education, fieldwork provides an effective avenue for involving students directly with the subject matter. Field trips ground learning, moving abstract concepts into the realm of the concrete.

Extended, week-long wilderness experiences also have well-documented psychological benefits that effect learning. After a decade of research, Kaplan and Talbot (1983) concluded that wilderness experiences increased individuals' awareness of their relationship with the natural world, increased self-confidence, and provided beneficial opportunities for reflection and contemplation, all of which enhance overall student learning. Reflection, through journaling or other activities, is a key to backcountry learning.

Experiential learning can also be facilitated in a classroom context. Cooperative learning requires students to work together on projects or tasks involving "joint intellectual effort" (Smith and MacGregor 1992). Cooperative learning techniques are indicated for complex and conceptual tasks, problem solving, and to nurture creative thinking and critical thinking. Wilderness issues fit each of these criteria. Documented learning outcomes include higher level reasoning and more frequent generation of new ideas and solutions when compared with traditional education (Johnson and Johnson 1991). Because wilderness issues call for interdisciplinary groups of professionals and citizens, the ability to work effectively in a group is essential (Ferreri and others 1998; Freimund and Brown 1995). Case-based approaches can facilitate application of concepts to a specific issue, enhance problem-solving skills, and provide cooperative learning.

Internships are an important way to facilitate experiential learning. Moore's (1992) research on internships indicates that "whereas most academic knowledge is presented by the teacher as fixed and immutable, experiential knowledge is often derived through the analytical and synthesizing efforts of the learner." Service projects also provide an avenue for application of concepts to real world issues.

Learning communities, where students are immersed in the study of a topic as a cohort, may also be an appropriate tool for wilderness education. A learning community is a purposeful restructuring of the curriculum to link courses together so that students find greater coherence in what they are learning and increased interaction with fellow students and faculty" (Gabelnick and others 1990). Learning communities increase intellectual interaction and result in an understanding of complex issues (Smith 1991).

A mix of experiential methods combined with traditional university teaching may be appropriate for the complex nature of wilderness and the learners themselves. A combination of teaching methods is suggested:

- Experiential learning in field and classroom.
- Traditional university teaching (lecture-style).
- Internships.
- Case-based problem solving.
- Hands-on service learning.
- Cooperative and community learning.
- Journaling and reflection.

Wilderness and Civilization: a Case Study

Wilderness and Civilization, established over 25 years ago, provides an opportunity to assess the effectiveness of a university-level wilderness studies program. This year-long wilderness program is part of the Wilderness Institute of the School of Forestry at the University of Montana. Wilderness and Civilization combines an interdisciplinary curriculum with a variety of teaching methods, and leads to an undergraduate academic minor. The program curriculum approaches wilderness from cultural, historic, management, scientific, literary, philosophical, artistic, and political perspectives. The goal is an educational program that functions as a whole, rather than a separate set of courses required to complete a traditional academic minor.

Wilderness and Civilization has a long-standing commitment to experiential teaching methodology. Students spend 45 days throughout the year on extended backcountry trips and shorter field trips where they study specific management and land use issues, ecological concepts, and natural history. A learning community is created because students take the program in a cohort of 25. Students also do internships with local organizations or agencies focusing on wildlands issues.

Wilderness and Civilization deliberately focuses on students' personal values. Students explore a diversity of ethical perspectives through readings, discussions, and meetings with guest speakers, and work to nurture their own personal land ethic (Yung and others 1998).

Previous Program Assessment

Course evaluations, journal entries, alumni surveys and interviews, and program materials have been examined throughout the years in an effort to ascertain learning outcomes. Data from these sources are consistently positive. For example, Dick Fichtler, Bureau of Land Management Recreation Planner and former Wilderness and Civilization student, claims that the program's emphasis on ethics carries over into his work as a land manager. Fichtler says:

> Wilderness and Civilization gave me the ability to articulate my land ethic. The program helped me to focus and define a land ethic, and to develop the skills needed to make it work in the real world. I now use these skills on a day-to-day basis in my work with a land management agency (Yetter 1997).

According to Former Wilderness and Civilization student and outdoor instructor Tracy Sawyer, the program's "interdisciplinary and interconnected learning set the tone for thinking in a holistic manner regarding wilderness, wildness, and society" (Yetter 1997). On a scale of 1 to 10, students consistently give the program 9 to 9.5 when compared with other educational experiences. Although student surveys are consistently positive and report that Wilderness and Civilization is a unique and enriching learning experience, there has not been a comprehensive, systematic assessment of learning outcomes.

The Need for Learning Outcome Assessment

Actual learning outcomes connect subject matter, students, institutions, methods, and desired outcomes in a series of potential assessment avenues. Assessment of actual learning outcomes informs the selection of teaching methods, the identification of learning outcomes, institutional capacity and creativity, student admissions, and the wilderness debate, as shown by arrows in figure 3. Each of these can be critiqued and improved upon through the assessment of actual learning outcomes.

In response to the need for assessment, the Wilderness Institute recently began a program of assessment to determine the effectiveness of Wilderness and Civilization in facilitating the specific outcomes previously outlined. Because some of the desired learning outcomes are already being assessed within individual courses, program-wide outcomes are the target of the larger assessment project. The challenge is to find ways to make learning outcomes tangible and to evaluate them. Because of the array of student learning outcomes outlined, multiple assessment tools are necessary to encompass the breadth, depth, and variety of students' knowledge and skills. This assessment needs to be authentic and to go beyond rote recall to demonstration of understanding, knowledge, and abilities (Wiggins 1989).

Certain content objectives can be measured through a quantitative instrument. A before and after administration of a problem-solving exercise will allow for the charting of

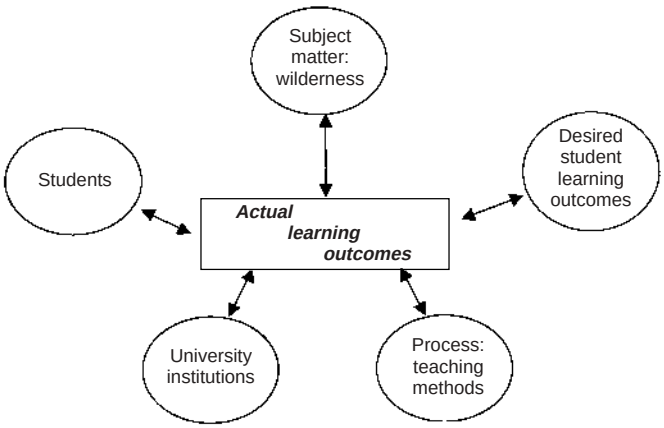

Figure 3—The relationship between subject matter, desired outcomes, students, methods, the university, and actual learning.

student progress during the program. This exercise will also allow us to differentiate between knowledge and skills students came to Wilderness and Civilization with, and those gained during the course of the program.

To assess program-wide outcomes such as the ability to respond in a clear, critical, sophisticated, and factual way to an environmental issue or to make innovative conceptual and practical connections across fields and disciplines, portfolios of student work may be an effective tool. Portfolios can assist educators in evaluating a wide variety of outcomes. Portfolios are not without pitfalls, however, and careful attention needs to be paid to student selection of materials, explicit purposes of the portfolios, and criteria for judging merit (Arter and Spandel 1992).

This assessment process will establish a feedback mechanism (fig. 3) to indicate the effectiveness of Wilderness and Civilization at achieving specific educational goals. The assessment process will be a valuable tool for the Wilderness Institute in directing changes of program curricula and teaching methods. It will also provide a case study to illustrate the effectiveness of this specific combination of assessment tools. Hopefully this will be of use to faculty at other universities in evaluating their own interdisciplinary programs.

Learning Outcomes Beyond the Wilderness Professional

Wilderness studies can be a vehicle through which students develop a personal relationship with nature, learn to make connections between art and science, nurture creative problem solving and critical thinking skills, and embrace multiple perspectives while simultaneously living by a personal ethic. If students of wilderness studies can begin to think on multiple scales, global, national, and local, from a multidisciplinary perspective, keeping in mind differing cultural priorities, they will be successful problem solvers and leaders in a variety of arenas.

For wilderness higher education to succeed, institutions must support interdisciplinary curriculums, embrace alternative pedagogy, and develop effective assessment tools. International dialogue will help facilitate the creative synergy needed to move in this direction.

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V. Understanding Threats and Services Related to Wilderness Resources

Native drummers welcome delegates of the 6th World Wilderness Congress (photo by Michael Olwyler).

6th World Wilderness Congress Chairman, Mr. Partha Sarathy (right), confers with fellow Congress attendee (photo by Michael Olwyler).

Can Community Forestry Conserve Tigers in India?

Shibi Chandy
David L. Euler

Abstract—Active participation of local people through community forestry has been successful in several developed countries. In the early 1980's, developing countries tried to adopt this approach for the conservation and management of forests. Nepal, for example, has gained considerable support from local people by involving them in conservation policies and actions. This paper illustrates that people living near the Sundarbans Tiger Reserve/National Park in India should not be considered mere gatherers of forest products. They can also be active managers and use forest resources sustainably, which will help in the conservation of tigers.

Conservation of tigers in Asia, especially in India, is a major concern. The Sundarbans offers a unique habitat for tigers, but the conservation strategies followed for the past 20 years have not yielded much result. One of the major reasons is that local people and their needs were ignored. Lack of concern for the poverty/forest interface, which takes a heavy toll on human lives, is another reason for failure. Tigers are the keystone species in this region, and it is necessary to preserve the whole ecosystem to maintain tigers. Humans are an integral part of the Sundarbans landscape, and as such, their needs also must be considered.

Better socio-economic conditions, through income generation from the forest, can focus conservation beyond the protected area boundary. Community forestry can help local people meet their needs while conserving the forest; this, in turn, will benefit tigers by maintaining the ecosystem in which they live.

The purpose of this paper is to recommend the application of principles of community forestry to the conservation of tigers in the Sundarbans Tiger Reserve/National Park.

In developed countries, like Canada, community forestry is recognized as power sharing between local communities and the government. Experiences from community forestry in British Columbia (Allan and Frank 1994) and four community forest pilot projects in Ontario, suggest that a greater degree of public participation in decisionmaking helps in the process of community development. For community forestry to work and establish itself, principles like employment, economic stability, and the community's interest in decisionmaking and planning are of vital importance (Ontario Ministry for Natural Resources 1994). In most developing countries, like India, the socio-economic problems will have to be addressed first to achieve the objectives of conservation (Kuchli 1997).

Royal Bengal Tigers (*Panthera tigris tigris*) (fig. 1) are endangered and almost on the verge of extinction. Conservation of these animals in Asia poses serious problems, as their population has been reduced significantly due to hunting, poaching, and habitat shrinkage. Reserves and parks have been established to protect the animals and separate people from the forests. This, however, has caused

Figure 1—The Royal Bengal Tiger of the Sundarbans (picture courtesy of the Zoological Survey of India, Calcutta).

In: Watson, Alan E.; Aplet, Greg H.; Hendee, John C., comps. 2000. Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management, and allocation, volume II; 1998 October 24–29; Bangalore, India. Proc. RMRS-P-14. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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resentment among the people living nearby. When parks and reserves are created by the government to protect endangered species, local inhabitants are not involved in decisionmaking or resource sharing. Almost overnight, use of the forest resources becomes the greatest threat to wildlife (Seidensticker 1997). The conflict that ensues may not solve the problem of tiger conservation because it does not consider the help of local people, nor does it try to educate the people. Instead of being part of the solution, local people become part of the problem.

In the early 1970's, the World Bank and other aid agencies realized that 40 percent of the rural population in developing countries lived below the poverty line, and that there was a need for "people's participation" in rural development. It was recognized that any development must consider the economic and social conditions of the rural people themselves as essential. This new approach drew attention to the "dependence" of rural people on forests and on forest products and their importance in the forest community (Tarnowski 1995).

Community forestry has been defined and named according to the context and country in which it is practiced. Following a World Conference on Agrarian Reform and Rural Development in 1979, programs were launched in developed countries like Canada and in underdeveloped countries like India, Nepal, and Thailand, under different names such as "social forestry," "forestry for local community development," or "community forestry." As defined by the Food and Agricultural Organization of the United Nations (FAO) in 1978, "community forestry" involves:

> ...local people in a forestry activity. It embraces a spectrum of situations, ranging from woodlots in areas which are short of wood and other forest products for local needs, through the growing of trees at the farm level to provide cash crops and the processing of forest products at the household, artisan or small industry level to generate income, to the activities of forest dwelling communities.

Community forestry is intended to provide rural families with certain basic needs from nearby forests on which they depend for their livelihoods. For a successful implementation of this goal, programs in community forestry must ensure participation of rural people in the conservation of forests, wildlife, and forest resources.

Community Forestry in Southeast Asia and India

The potential of community forestry was perceived by developing countries in the 1970's and 1980's as a method to rejuvenate degraded forests (Blair and Olpadwala 1988; Tarnowski 1995). Nepal is a leader in the demonstration of conservation ecology through community forestry. The Royal Chitwan Park in Nepal, a habitat for tigers and rhinoceros (*Rhinoceros unicornis*), was endangered due to overexploitation by the inhabitants for fuel and fodder. By promoting local guardianship to the people in the vicinity, providing an additional source of income through tourism, and favoring sustainable extraction of timber and fuelwood, the program has helped recover almost 15 km^2 of prime habitat for these species. As a result, poaching in this area has declined significantly.

Community forestry has been well known and widely accepted in India since the late 1930's when cooperative forestry management was introduced in Bastar, Madhya Pradesh. Dense population resulted in excessive cutting of trees. Uncontrolled use of firewoods and unrestricted grazing also took a heavy toll on the forests in the region. Fortunately, the local people and the administration recognized, in time, the gravity of the situation and devised a simple working solution. They decided to entrust actual management of the forests to committees either elected or appointed by the people. The project allowed the local people to take their requirements of firewood, bamboo, grass for grazing, and minor forest products from the protected forest area, but they were not given any proprietary rights over the forests. Community forestry in the Bastar region has had a far reaching consequence on the nature of forestry policies in India, particularly in recognizing the importance of the local people on issues directly connected with their daily livelihood—problems related to population pressure, overgrazing, agricultural land, and firewood collection (Anderson and Huber 1988).

The most well-known community forestry program in India was launched by the Community Forestry Wing of the Gujarat State Government in the 1970's. The program involved 3,500 village woodlot projects, each on the common land of a village panchayat (the local self-governing body at the village level). Each of the lots (about 5 ha) were given out to the villagers for fuelwood and fodder production for a period of 4 years. The Gujarat government provided management assistance, seedlings, and machinery; the panchayat provided labor and plant protection. At harvest, the government deducted the costs incurred and gave the rest of the produce to the panchayat to be redistributed to individual villagers. Although this project began as a state-sponsored project in 1979, the World Bank funded the project from outside and helped it make "tremendous strides" (Blair and Olpadwala 1988).

At an FAO workshop held in Dehra Dun, India, in 1977, participants from countries such as Afghanistan, Bangladesh, Nepal, Pakistan, and India, recognized how important it was to involve rural people in planning the development of forest lands and forest industries in less developed countries. The success of forestry development programs depends on the extent to which people adjacent to the forest areas are made participants in decisionmaking. A good example was provided by India, which, through its "Social Forestry" or "Forestry for the People" program, successfully involved local people in forestry plantations that were planned to provide support to agricultural activities such as windbelts and shelterbelts around farmlands, small timber for fencing, and small cottage industries (FAO 1977).

The Indian National Forest Policy of 1952 emphasized "the need for a sustained supply of timber and other forest produce required for defense, communication and industry" and "the need for the realization of the maximum annual revenue in perpetuity" (Kumar and Kaul 1996). This policy denied the needs of the local people whose lives directly depended on the forest for fuelwood, medicine, fodder, and small-scale industry. Although the contribution of the forest to the rural population living near the forest was talked about, it was only in the 1988 Forest Policy that issues of

public awareness and joint ventures between the agricultural and forestry section were initiated. In 1990, the Ministry of Environment and Forest emphasized the need for local participation to protect the forest in return for minor forest produce.

Population of the Royal Bengal Tiger in the Sundarbans

Evolutionary scientists believe that tigers evolved in Southern China more than a million years ago. Over time, to escape the Chinese hunters, they gradually migrated to Indochina, Indonesia, Burma, Bangladesh, and India (Ward 1997). Tigers have found a home practically throughout India, from the Himalayas to Cape Comorin, except the deserts of Rajasthan, Punjab, and Cutch. Migrating tigers from the Far East must have found a congenial home at the land's end in the Sundarbans area. Tigers from other areas of India, such as Uttar Pradesh, Madhya Pradesh, Bihar, and Orissa, might have possibly found a habitat in the dense mangrove forests of the Sundarbans, which offered them not only protection but also an abundance of food while fleeing from the colonial hunters.

To protect the tiger from extinction, the government of India passed the Wildlife Protection Act in 1972, and in conjunction with the World Wildlife Fund, launched what is called "Project Tiger." The tiger was declared the national animal of India, and a major part of the Sundarbans (approximately 2,585 km^2) was recognized as both a National Park and a Tiger Reserve, and became a protected habitat for the largest number of tigers in India.

The Sundarbans Reserve is the home of the tiger species known as the Royal Bengal Tiger (*Panthera tigris tigris*). The splendor of this magnificent and regal animal is heightened by its reddish brown skin and broad black stripes on its head and back. Initially, Linneaeus classified it as *Felis tigris*, but later scientists placed it under the genus Panthera because of its distinctive elastic hyloid bone formation. The Sundarbans tigers are somewhat shorter in length than their counterparts in other areas, but they have bigger heads and splayed legs. The uniqueness of the Sundarbans tigers is evident in the evolution of certain adaptive behavioral patterns not known to exist elsewhere in their kind, in the plains or in the peninsula (Chakrabarti 1992). The tigers here lead an almost amphibious life—cross wide rivers, drink saline water, and feed on pigs, fish, crabs, water monitors, and lizards. Another exceptional feature of these tigers in the mangrove forests is that they do not maintain any territories because urination marks are obliterated by tidal waters (Mandal and Nandi 1989).

The Sundarbans tigers are generally branded as man-eaters. Tigers are known to be man-eaters elsewhere in India, too. Jim Corbett (1942) attributes reasons of old age, disease, and injury to the man-eating habit of tigers in the Madhya Pradesh. But in the Sundarbans, the tigers are young, strong, and healthy. Chakrabarti (1992) believes that salinity of water is probably the most important factor responsible for a good percentage (25 percent) of tigers turning man-eaters. The salt water might have affected the kidneys and liver of the animals and hence changed their physiology (Chakrabarti 1987). Human behavior is also responsible for this propensity in the tiger. People who encroach upon the forest take little precaution against the tigers. They go into the Interior in small open dinghis (boats) and roam around together for months in search of forest products, making an easy meal for the tigers. Though these tigers have killed more than 600 people during the last 15 years, it is not true that every tiger in the Sundarbans is a man-eater. Chakrabarti asserts that man-killing in the tigers should be treated as an ecological reaction to the gross overexploitation of natural resources carried out by the humans for years together (Chakrabarti 1992).

In a census conducted in 1979, the tiger population in the Sundarbans was recorded as 205. In the next census in 1989, the population had risen to 269. Estimation of tiger population is based on pugmark (pawprints of a tiger left in the soil that help determine its size and sex) counting and analysis, and actual sighting (Chakrabarti 1992). Another census is in progress (fig. 2) and will be completed in 1999.

The Sundarbans Tiger Reserve

The Tiger Reserve in the Sundarbans (fig. 3) comprises 15 blocks of forest, covering a total area of approximately 2,585 km^2. The Tiger Reserve is bordered to the east by an international boundary with Bangladesh, to the west by the Matla River, to the south by the Bay of Bengal Sea, and to the north by the 24-Paraganas of West Bengal. The Reserve is divided into zones and blocks:

Zones	Blocks
Northern Zone	Pirkhali, Panchamukhani, Jhilla, Arbesi, Netidhopani, Chamta, Khatuajhuri, Harinbhanga
Central Zone	Chandkhali, Gosaba, Matla
Southern Zone	Chhotahardi, Mayadwip, Gona, Bagmara

In addition, there is a Buffer Zone comprising the remaining area of the Sundarbans in the north and west of the forest (Chakrabarti 1992; Management Plan 1982).

Figure 2—Tiger census in progress in 1988 (photograph courtesy of World Wildlife (India), Eastern Region, Calcutta).

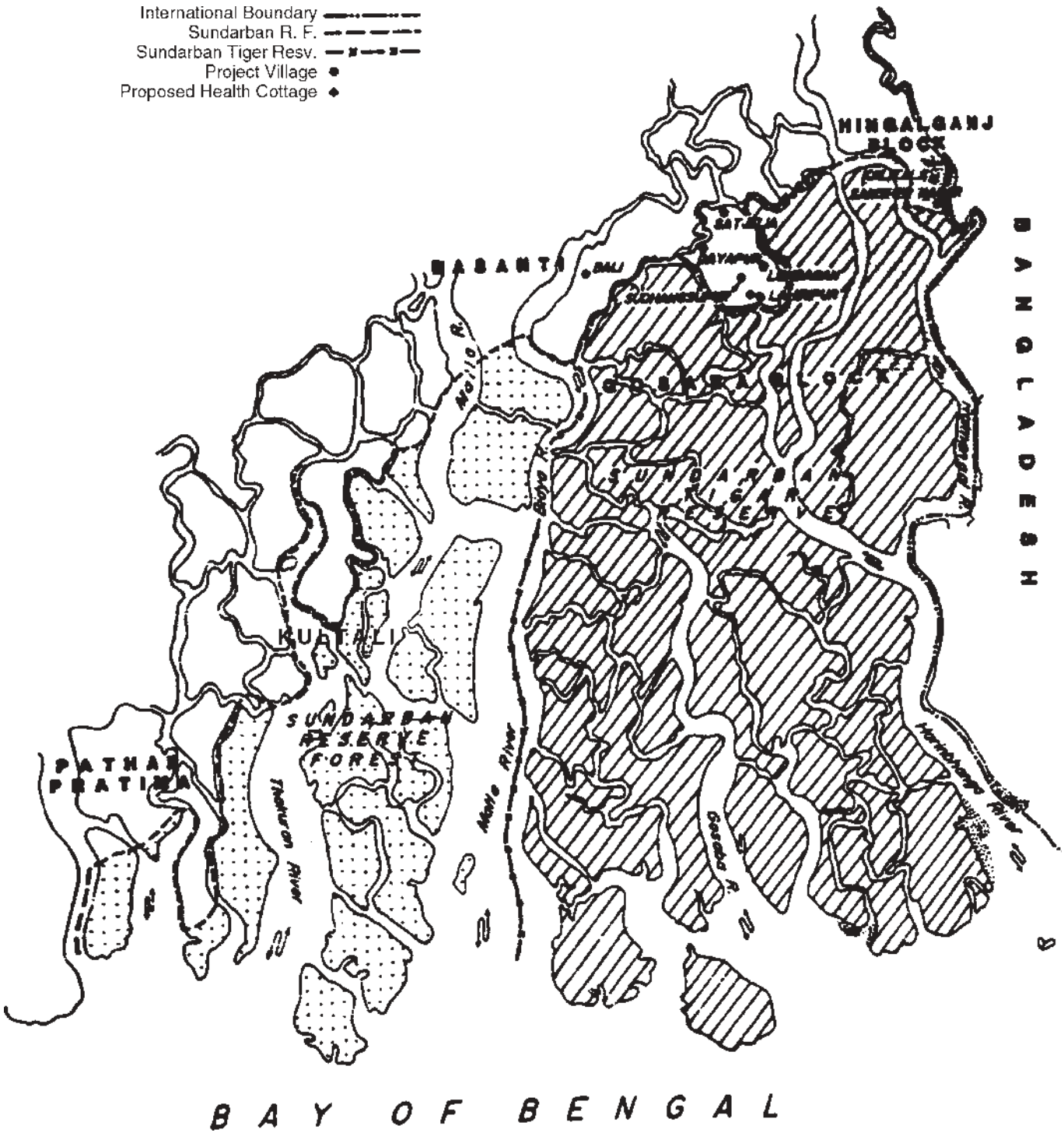

Figure 3—Sundarbans Tiger Reserve/National Park (map courtesy of the Zoological Survey of India, Calcutta).

The Ecology of the Sundarbans

The Sundarbans is an estuarine complex where three great rivers, the Ganga, the Brahmaputra, and the Meghna, meet to form an 80,000-km delta fringe—the largest tract of mangroves in the world. These are called the "Sundarbans" because of the dominance of a tree species (*Hertiera fomes*), which is called "Sunderi" (sunder means beautiful). The basin comprises a vast swampy area flanked by the massive Himalayas to the north, the Rajmahal hills to the west, and the Meghalaya Plateau and Chittagong hills to the east. The Sundarbans, part of which lies in Bangladesh, comprise an area of 9,827 km^2. The total area in the Indian sector, in the district of 24-Parganas, in West Bengal, is about 4,262 km^2, of which approximately half is under water.

The mangrove community is closely linked both to the sea and to fresh water from the land (fig. 4). A living buffer is created between the land and the sea. The mangroves are vital to the productivity of the entire intertidal ecosystem, and as Teas (1976) points out, they are valuable for shoreline protection and stabilization of soil and habitat. An abundance of organic matter transforms water into a rich nutrient, containing detritus particles that contribute toward estuarine and marine fertility (Heald and Odum 1970; Macnae 1974). The variety of the ecosystems becomes the nursery grounds for economically important fish and shellfish, and a natural abode for many groups of animals, including a large number of species that are known to feed, breed, and take shelter in the mangroves.

The Sundarbans mangroves are diverse and luxuriant. The growth and nature of vegetation in the Sundarbans are determined by factors such as (Chakrabarti 1992):

- The fineness, softness, and mobility of the clay.
- The lack of a solid base for the plants.
- The rate at which the humus is processed.
- The consequent dependence of plant life on the continual deposition of fresh silt (and its accompanying organic matter) brought down by the rivers.
- The salinity of the water.

The mangroves are adapted to the estuarine environment and animals inhabiting the region demonstrate, in turn, the same adaptability to variable salinity, muddy substratum, and periodic tidal flush. The Royal Bengal Tiger, a unique species occurring only in the Sundarbans mangrove, has also adjusted itself comfortably to this ecosystem (Mandal and Nandi 1989).

Human Interaction in the Sundarbans Forest Reserve

There is no human habitation inside the Sundarbans Forest Reserve. However, the Reserve is surrounded by many islands of villages, such as, Chamta, Chota Hadi, Kedo, Mayadeep, Raidighi, Kultali, Sajeria, Anandapur, and Lask Bagan. The people of these villages are extremely poor. They are almost fully dependent on the forest for their livelihood and survival. Subsistence is of primary concern for them no matter how great the risks are of being attacked by tigers (Chakrabarti 1992). Driven by poverty, these people invade the forest by the thousands every day to collect thatches, timber, firewood, honey, and seeds (eggs) of tiger prawn (fig. 5).

Figure 4—Submerged forest line during high tide (photograph courtesy of Dr. Kalyan Chakrabarti, Chief Conservator of Forests, West Bengal, Calcutta).

These people are also gradually encroaching upon the fringe areas of the forest in pursuit of agriculture and shrimp (*Metacarpus indica*) culture. They construct raised mud embankments and erect barriers in the rivers (known as "bundhs"), which help to prevent seepage of salt water into the agricultural land. Unfortunately, this method often fails, and the villagers, in their desperation for livelihood, keep on shifting from one piece of land to another, often with disastrous results. The bundhs arrest the flow of water and tidal waves and interfere with the natural equilibrium of the ecosystem (Sanyal and others 1984). As an alternative to agriculture, the villagers are turning to shrimp culture, which has become a very lucrative business in recent years. It involves almost 40 percent of the

Figure 5—Prawn seed collectors on their way to the interior of the forest (photograph courtesy of Dr. Kalyan Chakrabarti, Chief Conservator of Forests, West Bengal, Calcutta).

local inhabitants, including women and children, who venture right into the core area of the Sundarbans Tiger Reserve, and cause increasing ecological pressure in the region.

Socio-economic problems in the fringe areas of the Sundarbans forest are directly responsible for the fast depletion of the tiger population. Excessive use of natural resources by humans has forced the Bengal tiger to near extinction. Reclamation of forest land to meet the ever-growing demand for human settlement and agriculture has seriously affected the tiger population in the Sundarbans forest. Excepting man, as Chakrabarti (1992) points out, there are no other disturbing elements for the tigers in the Sundarbans. The World Wildlife Fund (WWF) is also alarmed at reports that a large number of people in this area are involved in tiger poaching. In a recent report, the Tiger Cell of WWF-India (Eastern Region) has identified economic poverty along the fringe area as the main reason for a critical ecological imbalance in the Sundarbans Tiger Reserve.

Application of the Principles of Community Forestry

To obtain local support to save the Sundarbans tigers from extinction, it is essential for a project to ensure full cooperation and joint decisionmaking between the locals, nongovernmental organizations, and the government. In a country like India, a large proportion of the population, especially in the lower income levels, depends on wood for cooking, heating, and agricultural processing. With the increase of population, there is a growing pressure on wood resources, resulting in depletion of forests and degradation of the environment.

The poor people cannot afford oil-based fuels and other sources of energy. Until they are provided with alternatives like electricity and cooking gas, they will tend to depend on the adjacent forests for fuelwood. Valmik Thapar, founder of the Ranathmbore Tiger Foundation in India, serves a warning note when he says, "Despite best efforts by conservationists, the tiger population in India could be gravely threatened if the local people living near tiger reserves do not derive economic benefits from tigers in the wild" (Trivedi 1998).

Forest policies in India were directed to separate the local people by restricting entry into the forests, which in turn caused resentment and hostility among the local inhabitants. The top-down approach divided the Sundarbans Tiger Reserve into core and buffer zones. The core zone restricts human interference. The situation was created so that the new generation of animals would migrate into the surrounding forest. Local users of the forest suddenly became a threat to wildlife. Since primary subsistence is the main concern for the people in the Sundarbans, the local inhabitants, despite all restrictions, venture into the core area for collection of honey, shrimp seeds, and leaves of Nipa fructicans, which are used as thatches. They hunt deer for meat and skin, wild pigs for meat, snakes for their skin, and birds to be sold in the market as pets. In search of a livelihood in these forests, they often encounter tigers and are attacked by them. When someone is attacked by a tiger, the villagers unite to take revenge, arguing that if they kill the man-eater, other villagers will be saved. They inject poison into the muscles of dead cattle to trap and kill the tiger. The socio-economic conditions of the people are responsible for such activities.

Kultali, a village adjacent to the Reserve, serves as a good example of the plight of those who live closest to the tiger reserve in the Sundarbans. This is one of the poorest villages of West Bengal. The livelihood of the villagers depends on the Sundarbans, where they gather fuelwood and building materials for their basic needs. They endanger their lives by going deep into the forest to collect tiger shrimp and honey, which they sell to middlemen to earn cash to buy other necessities of life. They live in houses built of mud and thatch roofing. There are practically no hard-surface or all-weather roads in the region. The roads are mud banks through which one person can barely walk. During the rainy season the banks give way, making it almost impossible to walk.

There are a few primary schools, but they lack both human and financial resources. Eighty percent of the pupils drop out of school; the literacy rate among girls is below 8 percent (Chaudhuri and Choudhury 1994). The locals depend on water drawn from ponds and streams—a health hazard since the water is not treated. Fewer than 10 percent of the houses have toilets of any kind. Malaria, influenza, and stomach disorders are common ailments among the villagers. There is no hospital or health clinic within 20 miles. However, there are quite a number of deaths from tiger attacks.

Conservation Strategies

Conservation of tigers in the Sundarbans requires sound strategic planning, with a goal to maintain or enhance long-term social and economic well being of the communities in the buffer and outer fringes of the forest. To this end, it is essential to:

1. Promote eco-development in the area. This could include encouraging agriculture and fish culture in the same land. Indigenous fish have a good demand in the local market, but these are often ignored by fishermen in preference to shrimp seeds and exotic carps, which have a high value in both local and international markets. Crop rotation of rice and other cash crops, such as vegetables and fruits, would help increase soil fertility and the economic condition of the people. Encouraging locals to grow timber and fruit trees in the courtyards of their homes could yield timber and fruits for domestic use. Tapping of minor forest products, such as tannin and wax, could generate income and employment for more local inhabitants.

2. Ensure sustainable agriculture, shrimp culture, and honey collection to help generate a steady income for the people. Local inhabitants discard any small fish and shrimp varieties other than *Metacarpus indica*. Encouraging and developing ways to grow other shrimp varieties, such as *Acetes* sp., *Macrobrachium iamarei*, and *Parapenaeopsis sculprilis*, would help in reducing the pressure of over exploitation in the Sundarbans estuaries and reduce the chance of the local people being attacked by tigers. Honey collection is another means of livelihood for locals. Domestication of *Apis dorsa* (honey bee) could also involve women in the area in resource generation.

3. Remove the curtain of law that separates people from their environment. There is a barrier between the local people and the government and its officials, who often harass the inhabitants for exploiting the forests. Cooperation between government officials and local inhabitants could remove this barrier. Transferring some rights, like felling of trees and sharing some of the related profits with the government, would certainly make the local people feel that the forests are owned by them rather than by the government. This would motivate the local inhabitants to safeguard the forests and its resources from being overly exploited.

4. Involve local people as a resource in the decision-making process. Indigenous people are aware of their environment, available resources, and means of exploiting them. Interacting with them in the decisionmaking process could help in educating them to exploit the resources sustainably and scientifically. Networking and establishment of rural institutions would allow communities to learn from each other.

5. Make certain that local communities receive education to understand the importance of conservation. Since most people in this area are illiterate, it is essential to teach them the importance of conservation. Education through their cultural and social beliefs could have a significant impact on their understanding of conservation problems. This would also mean redefining community forest practices in India by recognizing: (a) who is the beneficiary, (b) who decides what, and (c) how broad-ranging conservation objectives are to save the tiger.

Conclusions

Poverty, lack of awareness, and overpopulation lead to excessive exploitation of the forests and thereby cause a serious threat to conservation strategies. The lives of the people living close to the forests are closely associated with it. Their basic survival depends on the forests. This will continue to increase the pressure on the forests unless their socio-economic conditions are improved. Conservation of tigers, a keystone species in the Sundarbans ecosystem, will be next to impossible unless the local people are involved in management, the decisionmaking process, and developing techniques for sustainable yields from the forest. In India, the government and its agencies have been in charge of policy and decisionmaking. The Forest Policy of 1988 highlighted the issues of public awareness and joint ventures, a breakthrough for achieving better cooperation from the people for conservation strategies. Cooperation, collaboration, and joint ventures between the government, nongovernmental organizations, and the local people can go a long way in the conservation of the Sundarbans tigers.

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Wilderness Within World Heritage: Te Wahipounamu, New Zealand

Les Molloy
Murray Reedy

Abstract—The Te Wahipounamu World Heritage Area, 2.6 million hectares (6,424,600 acres) of mountains, glaciers, forests, and fiords, contains New Zealand's main wilderness resource. The Department of Conservation's comprehensive Visitor Strategy has been used to manage visitors to the widely differing sites within the World Heritage Area system. Most management effort is focused on the increasing number of visitors who require access and facilities in the frontcountry, and the large group of discerning backcountry users who use the "Great Walks." Four wilderness areas, making up 10 percent of the World Heritage Area, are strictly managed for wilderness recreation, and there are proposals to designate two additional areas for wilderness users.Unresolved management issues are: the need for more marine conservation, the need for better control of introduced animal pests, and the disruption of natural quiet by tourist flights.

The Southwest of New Zealand's South Island is one of the great wildernesses of the Southern Hemisphere. It is a remote, unoccupied landscape, both forbidding and beautiful. It contains New Zealand's most outstanding wild landscapes—the fiords, the Southern Alps, the great glaciers, and the turbulent rivers descending to the vast temperate rainforests of the West Coast, and the wide open spaces of the Eastern tussock grasslands and glacial lakes in the rainshadow of the Alps.

During the 1970's and 1980's, bitter resource controversies raged throughout the Southwest, with wilderness advocates opposing:

- Raising of Lake Manapouri in Fiordland National Park for hydroelectricity.
- Mining of asbestos in the Red Hills ultramafic area.
- Formation of a 120 km tourist road between Haast and Milford Sound.
- Nonsustainable logging of the magnificent Rimu and Kahikatea Forests of the river terraces and moraines of South Westland.

After 2 decades of intense resource controversy, the New Zealand government unequivocally opted for conservation by reserving the lowland rainforests of South Westland, passing them to the management of the Department of Conservation, which already managed the primarily mountainous national parks. Soon after, in December 1991, the United Nations Educational, Scientific and Cultural Organization (UNESCO)—without hesitation—designated this 2.6 million hectare wilderness (an extraordinary 10 percent of the total area of New Zealand) as the "Te Wahipounamu (South-West NZ) World Heritage Area."

The name "Te Wahipounamu" is an ancient Maori term for the whole area, meaning "The Place of the Greenstone." Pounamu, or "greenstone,"is a nephrite found in isolated lenses along the path of the great Alpine Fault; pounamu is highly prized for its beauty and utility by the indigenous people, the Maori, who traveled into the interior of the wilderness to gather this "taonga" (treasure).

Te Wahipounamu has four National Parks—Fiordland, Mount Aspiring, Mount Cook, and Westland—as its cornerstones. These mountainous limbs are skirted by the lowland rainforests of Waitutu and South Westland (fig. 1).

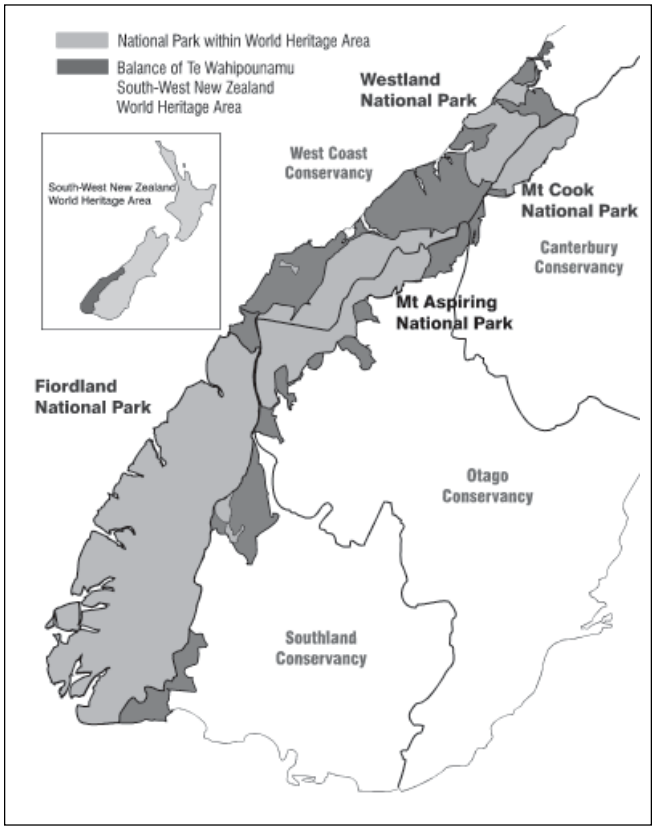

Figure 1—National Parks within Te Wahipounamu South-West New Zealand World Heritage Area.

In: Watson, Alan E.; Aplet, Greg H.; Hendee, John C., comps. 2000. Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management, and allocation, volume II; 1998 October 24–29; Bangalore, India. Proc. RMRS-P-14. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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The main tourist attractions of the South Island lie within the World Heritage Area:

- Milford Sound and the Milford Track
- Lake Te Anau and the Kepler Track
- The Routeburn Track and Mount Aspiring
- Mount Cook (Aoraki) and the Tasman Glacier
- The Franz Josef and the Fox Glaciers

A measure of the integrity and "outstanding universal value" of the South-West is the recognition by UNESCO that it meets all four criteria for World Heritage status by:

> I...containing major features of earth's geological history, especially the uplift of mountains along a plate boundary and the development of glacial and marine terrace land forms;
>
> II...exhibiting significant on-going evolution of alpine herbfield, forest and wetland habitats since the last glaciation;
>
> III...having many areas of exceptional natural beauty and aesthetic importance; and
>
> IV...containing some of the most important habitats for the conservation of the biodiversity of ancient Gondwana.

Visitors Within the World Heritage

Te Wahipounamu is an extremely robust landscape, defying past human attempts at settlement. The only residents are temporary, mainly associated with tourism (regulated by the Department of Conservation) or fishing in the fiords. There are two main road corridors into and through the wilderness—the Haast Highway and the Milford Highway, each of them a narrow ribbon through the mountain passes, valleys, and forested coastal plain, each vulnerable to earthquake, rockfall, avalanche, and flooding in this most dynamic of landscapes. A network of 10 visitor centres and many interpreted nature walks are dispersed along these "Heritage Highway" corridors (or "aranui"), catering to visitors who want to learn more about the biodiversity and history of the landscape without having to venture far from the road (Molloy 1992).

Wilderness Areas

At the other extreme, there are four wilderness areas (wild areas managed strictly in terms of the New Zealand Wilderness Policy) within the World Heritage site:

- Hooker-Landsborough (41,000 ha)
- Olivine (80,000 ha)
- Pembroke (18,000 ha) (fig. 2)
- Glaisnock (125,000 ha)

These areas are depicted in figure 3 in relation to the main visitor centers and Heritage Highways. The four areas are dispersed throughout the World Heritage Area and, together, add up to 10 percent of the total area. As wilderness areas, they are managed as places where visitors enter "on nature's terms." There are no visitor facilities such as roads, huts, and bridges; there are not even any tracks. Air access to the wilderness areas for recreational or commercial purposes is not allowed, although the Department of Conservation periodically sanctions aerial hunting of wild introduced animals, which are serious pests because of their detrimental impacts on the native flora and fauna.

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Figure 2—Lake Nevernever lies in the heart of the mountainous Pembroke Wilderness Area in Fiordland National Park.

The wilderness areas are well buffered by a natural landscape that does have a degree of visitor facilities and services. Overall, Te Wahipounamu provides recreational and educational experiences for a wide range of visitors. The way in which an acceptable level of visitor use has been planned for, within such a natural World Heritage Area of high biodiversity and wilderness conservation value, is worth explaining more fully.

Planning Framework for Wilderness in Te Wahipounamu

The planning framework for the management of the wilderness resource of the Te Wahipounamu World Heritage Area is illustrated in figure 4. It spans national, regional, and local communities of interest and levels of

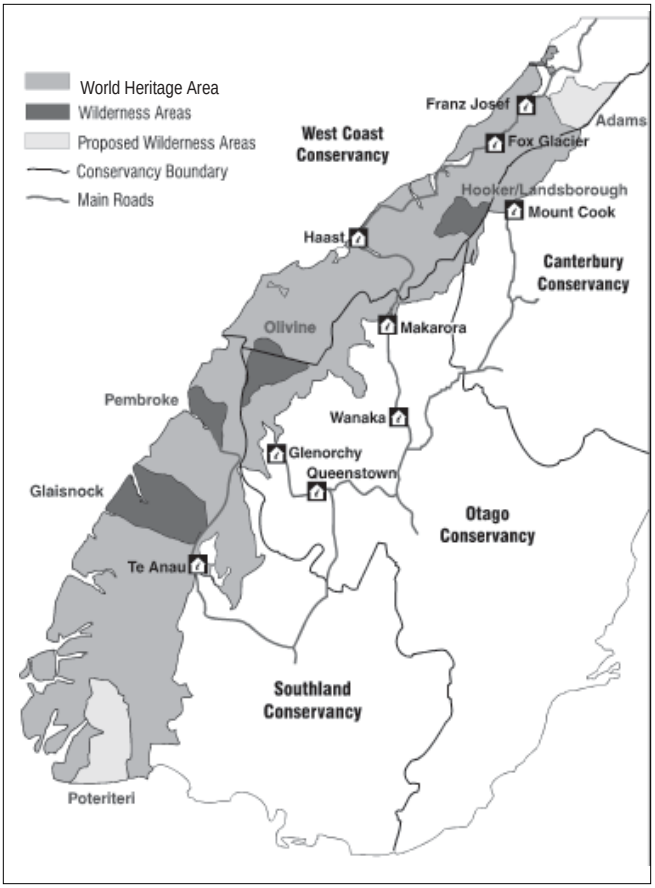

Figure 3—Conservation Visitor Centres and access to Te Wahipounamu South-West New Zealand World Heritage Area.

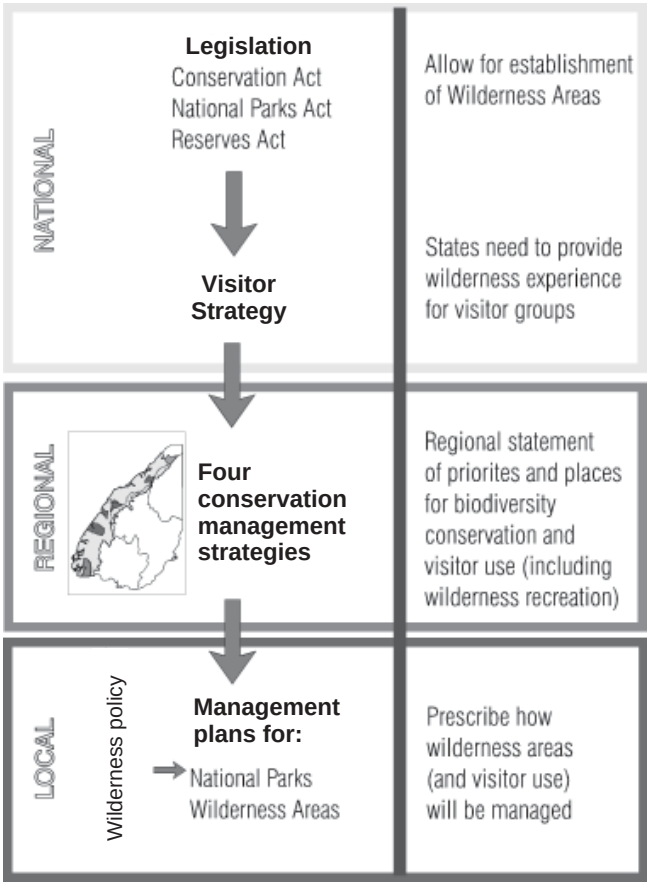

Figure 4—Framework for wilderness management.

decisionmaking. There are four main planning entities: legislation, visitor strategy, conservation management strategies, and management plans.

Legislation

In New Zealand, there is no specific legislation for World Heritage Area management. The New Zealand conservation legislative provisions are well developed so that Te Wahipounamu, like other protected areas, is conserved through the provisions of the Conservation Act, National Parks Act, and Reserves Act. Each of these pieces of legislation empowers the designation of Wilderness Areas.

Visitor Strategy

The Department of Conservation manages all visitor sites within the World Heritage Area in terms of its Visitor Strategy (Department of Conservation 1996). The strategy divides all visitors into seven different visitor groups (fig. 5). The Department is committed to providing quality recreational opportunities, and where appropriate, it also provides facilities within Te Wahipounamu for six of these visitor groups:

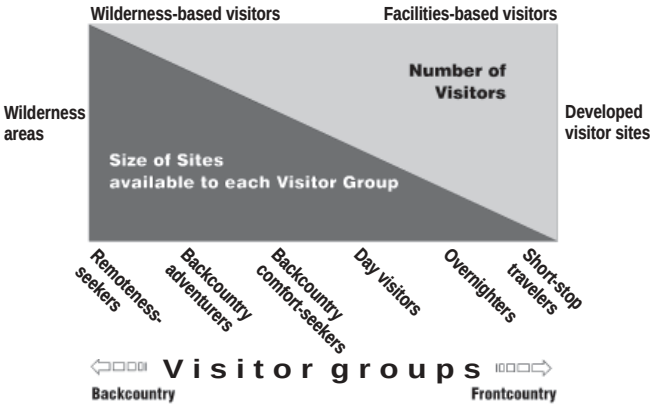

Figure 5—Recreational opportunities for visitor groups.

- Short-stop travelers
- Overnighters
- Day visitors
- Backcountry comfort-seekers
- Backcountry adventurers
- Remoteness-seekers

The seventh category, "thrill-seekers," such as white water rafting and parapenting, may not take place within wilderness areas unless the activity complies with the strict conditions of the wilderness policy.

Conservation Management Strategies

These statutory documents are the regional conservation statements. They have been established for each administrative region of the Department of Conservation following wide-ranging public consultation. They outline the strategic priorities and key sites for biodiversity conservation and visitor recreation (including wilderness areas). Integrated conservation management for Te Wahipounamu is achieved by four of these Conservation Management Strategies because the World Heritage Area spans the contiguous conservancies of West Coast, Canterbury, Otago, and Southland (Reedy and Doole 1992).

Management Plans

Management plans are place-based statutory management prescriptions for specific sites within Te Wahipounamu, where particular conservation objectives need to be clearly set out. Each National Park has a management plan.

Sites Available to Different Visitor Groups

The inverse relationship between the "size" of the sites available to the different visitor groups and the "number" of visitors in each group is illustrated in figure 5. The three groups that use the frontcountry are numerically the largest; they are the main users of campsites, picnic areas, and short walks along the heritage highways. These visitors have different needs and expectations than visitors who use the backcountry, and the Department of Conservation has invested heavily in quality assurance programs designed to ensure that a suitable standard and range of facilities is available for each user group. Overall, frontcountry visitors are confined to highway corridors where impacts are localized.

Visitors who use the backcountry of Te Wahipounamu fall into two main groups—those who desire facilities and those who desire wilderness. There are two groups of visitors who desire facilities—the "backcountry adventurer" (BCA) and the "backcountry comfort-seeker" (BCC). The characteristics of BCA and BCC visitors are similar in only one respect, that of the requirement for huts, tracks, and bridges to facilitate access and enjoyment.

In the past 10 years or so, some BCC sites within Te Wahipounamu have become a mecca for overseas backpackers. This group desires the highest standard of facilities possible, consistent with a backcountry experience, and have become the dominant users of some of the Great Walks (such as the Milford, Kepler, Routeburn, and Greenstone Tracks), as well as a number of lesser-known Top Tracks (such as the Dusky Track, Hollyford Track, Rees-Dart Circuit, and the Copland Valley Track). On the other hand, many backcountry adventurers are New Zealanders on holiday who are now choosing more remote backcountry sites to avoid the sites that are popular with overseas backpackers.

The Department of Conservation has developed a comprehensive Visitor Asset Management Program to delineate all visitor sites with facilities (3,700 nationwide) and inventory the 15,300 structures used by the different visitor groups to these sites. This program has been established to provide quality assurance across the whole spectrum of sites that visitors use. Nationally, there are a total of 1,280 BCA and BCC sites in the backcountry. Relatively few are provided specifically for BCC's (132); however, these sites are expensive to operate and a significant cost against the total visitor asset. Conversely, many structures on BCA sites are failing the standards now set by the quality assurance program. The dilemma of this situation is compounded by the need for the Department of Conservation to invest in facilities and opportunities that return the best outcomes for both conservation and visitors. As the new quality assurance program begins to bite, the quantum of facilities available to visitors will shrink, causing more competition for space and heightening the tensions between BCA and BCC groups.

Within Te Wahipounamu, the contrast between the two types of backcountry visitor group sites is even more acute because the BCC sites are the most popular with overseas visitors. Virtually all the BCC sites are high priority Great Walks (such as Milford, Routeburn, and Kepler Tracks), while the bulk of the BCA sites are frequented by significantly fewer visitors who are mostly New Zealanders. The likely outcome, as these BCA facilities fail to meet quality assurance standards over time, is that large sections of Te Wahipounamu will become "de facto" wilderness areas—joining the four "de jure" wilderness areas to provide a vast resource of wildland.

The eventual reduction in BCA sites, therefore, will benefit the numerically smallest backcountry visitor group, the "remoteness-seekers," who are not facility-dependent (fig. 5). Currently, remoteness-seekers are remarkably well provided for in Te Wahipounamu, and they will eventually have approximately 2 million hectares of wilderness (including the four designated wilderness areas) available to them for wilderness recreation in the world heritage area. However, members of this group have a valid claim in their assertion that the Department of Conservation and the New Zealand Conservation Authority have been slow to implement the recommendations of the 1981 Wilderness Conference (Molloy 1983) and the government's Wilderness Advisory Group for two more gazetted wilderness areas within Te Wahipounamu. These two proposed areas lie at the extreme ends of the World Heritage Area—Adams, based on the large névés of the Gardens of Eden and Allah, and Poteriteri in southern Fiordland. In its most recent strategic business plan (Department of Conservation 1998), the Department of Conservation identified the designation of these two wilderness areas as a priority objective.

Issues Resolved in Management of Te Wahipounamu

In the past 20 years, a remarkable number of resource and management issues have been resolved in the South-West, each conferring stronger protection or allowing greater conservation value to be accumulated within the protected areas. Some of the major achievements have been:

1. Stopping the raising of Lake Manapouri and Lake Wanaka for electricity generation.
2. The incorporation of the mineralized Red Hills area within Mt Aspiring National Park.
3. The protection of the lowland podocarp rainforests of South Westland from logging.
4. The gradual phasing-out of grazing from the Mavora Lakes area and the valleys radiating from Mt Aspiring National Park.
5. The settlement of the Ngai Tahu Tribe's claim for redress of rights under the Treaty of Waitangi.
6. The establishment of a regime for the management of tourist concessionaires.
7. The preparation of Regional Conservation Management Strategies for the whole of Te Wahipounamu, providing the basis for integrated management by the Department of Conservation.
8. Formal protection of Hooker-Landsborough and Olivine Wilderness Areas.

The Ngai Tahu Tribe was a major partner in the nomination of the World Heritage site proposal to UNESCO and, indeed, the name "Te Wahipounamu" was their suggestion because it was a traditional name that embraced the whole South-West. The settlement of their "Treaty of Waitangi" claim has a number of interesting management implications for the World Heritage Area:

1. The name of Mount Cook (fig. 6) will become "Aoraki/Mt Cook," and 88 other topographic features (most of them in the World Heritage Area) will, in the future, have dual Maori/English names.
2. The title for Aoraki will be returned to the Ngai Tahu Tribe who will, in turn, gift Aoraki to the people of New Zealand "...as an enduring symbol of the Ngai Tahu's commitment to co-manage with the Crown, areas of high historical, cultural and conservation value."
3. The Tribe will be given rights of access and temporary occupancy for the gathering of traditional foods and other materials.

Issues Still to be Resolved Within Te Wahipounamu

In a natural area as large as Te Wahipounamu, it is not surprising that there are still a number of policy and management issues that need to be resolved, including:

1. The environmental threat of a "Haast-Hollyford Road."
2. Forging of a working partnership with the Ngai Tahu iwi Tribe.
3. Peserving "natural quiet," which is often disrupted by tourist aircraft.
4. Establishing a marine component to the World Heritage Area, and better protection of the coastal "wilderness."
5. Reducing populations of introduced animal pests to ecologically acceptable levels.
6. Addressing the future of cattle grazing licenses within a few remaining valleys.

The proposal from some sectors of local government and the tourist industry, for a 120 km toll road linking Haast with the Hollyford valley (near Milford Sound), is the most overt threat to the integrity of Te Wahipounamu and its wilderness. It is an issue that seems, for the present, to have had its teeth pulled by the combination of New Zealand's stringent resource management legislation, the cost of construction, the measures required to mitigate environmental effects, and the weight of adverse public opinion. It would seriously impinge on the buffer to the Olivine Wilderness Area if it were to be constructed.

Protecting the "natural quiet" of wilderness has become a significant issue in Te Wahipounamu, where a burgeoning industry based on tourist aircraft overflights is raising tensions between backcountry visitors (RS, BCC, and BCA groups) and frontcountry visitors (SST, ON, and DV groups). Air access policies are set down in Department of Conservation regional Conservation Management Strategies; however, overflights are not able to be regulated by these documents. Department of Conservation and civil aviation

Les Molloy

Figure 6—Mount Cook National Park is a key visitor attraction within the Te Wahipounamu World Heritage Area. The Park is also important to the Ngai Tahu Tribe, the Maori occupiers at the time of European settlement of New Zealand in 1840. In settling a claim by Ngai Tahu under the Treaty of Waitangi, the New Zealand government has decided to change the name of the Park (and the highest peak in New Zealand) to Aoraki/Mt Cook, and to recognize the future role of Ngai Tahu as comanagers of the Park.

regulatory authorities are working with air transport operators to resolve this matter in ways that accommodate the needs of all parties, but there is no universal solution yet in sight.

The two most important biodiversity conservation issues remaining are (1) the lack of marine protection in the fiords and along the south coast of Fiordland, and (2) the continuing need for control of the wild, introduced animals that negatively impact the flora and fauna of the World Heritage Area.

The marine environment of Te Wahipounamu is not protected by the National Park or Conservation Area status of the adjoining land. In Fiordland National Park, the marine ecosystem within the fiords is unique in the world for the combined effects of freshwater and saltwater circulation, and the diversity of warm-, cold-, and deep-water marine species. Added to this is the unparalleled wilderness value of the 1,900 kilometers of unprotected, wild, uninhabited coastline within the sheltered environment of the fiords.

Protection of the World Heritage Area coastal and marine environments has been complicated by a set of circumstances similar to those regarding the protection of "natural quiet." Regional Conservation Management Strategies can advocate for protection of the coastal and marine environment, but they are dependent on partnerships with communities, other agencies, iwi Maori, and the support of other statutory planning documents.

In the case of Te Wahipounamu, two Marine Reserves have been established in the Fiords, and additional areas have been identified for protection. These measures are as yet insufficient for ecosystem protection, and more consideration needs to be given to other protection measures. Some recent measures have been taken to protect the wilderness values of the "wild" coastline by coordinating the statutory policies of the Department of Conservation (Mainland Southland Conservation Management Strategies) and Local Government (Southland District Plan).

Introduced herbivores and predators are having a severe impact on the natural diversity of Te Wahipounamu. Red deer are widespread; other browsing mammals such as wapiti, fallow deer, goat, and chamois have restricted distributions, but the combination of these animals threatens the integrity of the forest and alpine ecosystems. In the north and west of the World Heritage Area, the Australian brushtail possum (*Trichosurus vulpecula*) has caused severe mortality in montane hardwood forests, and introduced mustelids and rodents have had a widespread and devastating impact on indigenous fauna. Several species have become extinct and others are endangered or in decline.

The Department of Conservation has had to find innovative ways to deal with these threats to stave off further extinctions and loss of biodiversity. Historically, the thrust has been toward species management, but in recent years, new initiatives have focused on integrated programs targeted at the critical pests within priority places. This method has required conservation biologists and ecologists to identify places where natural diversity is greatest and where specifically targeted interventions will have the greatest outcomes for conservation.

An example of an integrated program is the management interventions directed at conserving the endangered Okarito Brown Kiwi (*Apteryx* "Okarito Brown")—a rare ground nesting bird that is confined to a relatively small area of lowland forest otherwise occupied by many introduced pests. In this situation, research has determined that just two pests, stoats (*Mustela ermina*) and Australian brushtail possum, are critical threats to the survival of Okarito Brown Kiwis. Control measures against these two pests have significant conservation benefits when integrated with species-specific conservation measures.

Conclusions

The vast wilderness resource within Te Wahipounamu can now be said to be under sound management with regard to the provision of opportunity and the regulation of impacts from visitors. The integrity of New Zealand's greatest wild landscape has been protected from human exploitation—no easy task. The designation of further strict wilderness areas within the World Heritage Area is a definite prospect.

There are a number of remaining concerns for biodiversity conservation, especially from the impacts of introduced animal pests. In many respects, this remains the single greatest threat to the natural diversity of Te Wahipounamu. It could be argued that the protected marine ecosystems adjacent to Te Wahipounamu are not sufficient to provide a representative marine component to the World Heritage Area. However, regional Conservation Management Strategies have set priorities and goals for biodiversity conservation, including protection of the coastal and marine systems, and these will be systematically implemented.

There is a question as to the need for a process that might better integrate the four Conservation Management Strategies that relate to Te Wahipounamu. These strategies are the principal means of achieving the conservation and protection goals of the World Heritage Area, but they are essentially stand-alone documents. It remains to be seen if the statutory framework that underpins the protected status of the area is sufficient to ensure that management can achieve all of the conservation outcomes required to ensure the continuing integrity of Te Wahipounamu as a Natural Heritage property

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Conservation Thoughts from Central India

Hari Dang
Himraj Dang

Abstract—In presenting India's wildlife conservation problems in light of the opportunities presented by economic liberalization and government decentralization, this paper suggests novel ways of involving private Indian efforts to support conservation. Conclusions include the expansion and linkage of selected parks, the promotion of ecodevelopment in areas around parks, the expansion of noninvasive tourism and private silviculture around parks, and the involvement of private Indian corporations, foundations, cooperative groups, and schools and colleges in conservation at selected parks. (Though this paper was written by both Hari and Himraj Dang, it was presented by Hari Dang and retains references to the first person.)

To put this talk in perspective, I should mention that I have been involved with public policy on wildlife conservation in India since 1952, when the Indian Board for Wildlife was formed in New Delhi under the Chairmanship of the late H. H. Maharaja Jayachamraja Wodiyar of Mysore. At that time, M. D. Chaturvedi was the Inspector General of Forests of India. Nearly two generations of Indians have grown up in freedom since then, several thousands of whom I have enjoyed interacting with at school as their teacher, rector, and headmaster, successfully encouraging a love of India's wild places, the great Himalayan mountains, varied forests, rivers, and coastlands. Much of the world has grown closer and become more prosperous, and is now concerned with its quality of life and environmental health. An interest in environmental issues and wild spaces has emerged the world over.

But in India, despite our early idealism and the tradition of respect and love for nature and the wilderness, we have sadly failed to protect our forests and our wildlife. In my own lifetime, I have lost most of the wilderness areas, the forests, the 'khadars' (riverine forests), and the 'scrub-lands' (now called wastelands) that I grew up roaming and loving with a grand passion. There are very few great 'Mahaseer' fish in the Himalayan streams now. The tiger, symbol of the Indian forest, is decimated (in spite of the much-publicized Project Tiger) and could be heading for extinction unless we change our short-sighted, narrow-minded, urban-centered policies. With the near demise of the tiger, we have lost much of its prey and its 'rahans' (dense jungle recesses) and habitat. The wild and forested lands' "roar, trumpet and song" continue to recede and reel under 'democratic' social and human pressure, nonexistent grassroots resource management, and increasing field indifference. Forests have been settled under electoral pressures all across the wildlands of India. Poaching, timber theft, overgrazing, and imperfectly planned and uneconomic public sector projects too numerous to mention have undermined or destroyed much of the remaining climax forests. I am sorry to say that today we can neither present a successful Indian model of harmonious living with nature, nor a successful model of rapid, environmentally sustainable economic and human resource development.

The imperatives of growth leading to increased environmental stress, and the urgency of saving threatened biodiversity and its wilderness habitat through protection, have generated a tragic conflict between the competing demands of development and conservation. Overriding and overruling the idealistic enthusiasm of traditional naturalists are the modern street-smart environmental lobbyists with their wheeling-dealing, intercorporate rivalry and corporate espionage, in which the government and the independent sector are players and partners alike.

The short-term conflicting interests of development and conservation in India will only intensify with the continuing, unsustainable and unbalanced population growth rates and the aspirational pressures of our people and our successful, federal democratic polity. This overregulated and undergoverned country does not naturally lend itself to rational land use or efficient natural resource planning. This is one reason why American and European models of conservation, and the emerging ecological slant in environmental thinking abroad, will not address India's contemporary socio-economic situation. Industrialized countries are realizing they can afford to place a higher emphasis on environmental values and afford more "development" and less "growth." By contrast, in India, we are still looking at explosive growth of human and livestock populations, material welfare and standards of living, roads, electricity generation, fertilizer use, coal and fuel consumption, airports and ports, and urban and industrial waste—and soon. This prognosis of imminent environmental stress is simply a fact of life and cannot be ignored. There may be more or less efficient economic models for India to use, but any country with a billion people, over half who are illiterate, and a

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Hari Dang, Padma Shri, has been involved in advisory and editorial capacities with conservation and environmental policies in India since 1952, when the Indian Board for Wildlife was formed. He was a Member of the Expert Committee for National Parks and Sanctuaries, 1970, the Report of which formed the basis for wide-ranging downstream legislation. He was Editor of Cheetal, Journal of the Wildlife Preservation Society of India, Dehra Dun; Chief Investigator of the Himalayan Wild Life Research Project; author of numerous monographs and a book entitled "The Snow Leopard and its Prey" (under re-print); currently Editor of the International Journal of Sustainable Development, and engaged in the project for the rediscovery of the mountain quail. The millenial slogan he advocates through his Journal is that of "Conservation for Development." E-mail: hdang@del6.vsnl.net.in. Himraj Dang is an amateur conservationist and the author of a book entitled "Human Conflict in Conservation: Case Study of the Rajaji National Park." His permanent address is 924 Sector 17B, Gurgaon 122001, Haryana, India, e-mail:Himraj.Dang.89@alum.dartmouth.org.

majority who have no access to clean water, sewage treatment, and health care, not to mention jobs and social security, cannot afford not to both grow rapidly and to develop.

It is with this perspective that I am presenting here today several ideas that can help save what we have left of India's precious wilderness habitats. I am presenting these ideas, which have not been part of official or nongovernment Indian conservation organization thinking in the past, only because I do not believe an incremental approach of "more of the same" kind of failed policies of the past will help. If some of these ideas sound audacious, then you must bear in mind that the facts about the perilous state of India's wildlife today are audacious and shameful.

I base my comments on emerging themes in wildlife conservation in India as a result of nonofficial, in-depth study visits to key National Parks in the central Indian state of Madhya Pradesh, as well as some other locations in other States. These Madhya Pradesh National Parks provide an illuminating contrast to neighboring States, where population pressures and poor management have seriously undermined conservation efforts. At the risk of repeating platitudes, there are some important directions as to how contemporary India, in the process of liberalization and increasingly directed to higher rates of economic growth, can better manage her natural patrimony. These tentative suggestions, involving a greater role for private participation by various elements of Indian society, are discussed.

Size Matters

There is little ultimate conservation value in increasing or establishing budgets for small parks and sanctuaries (for example, Sitamata, Darrah, Shivpuri, Hastinapur, Karera, and Kumbalgarh) that can hardly be extended, let alone protected effectively, given the insurmountable pressures from the surrounding areas. There may be other reasons for States to protect these small parks, but from a national point of view, a park like Kanha in Madhya Pradesh, with an area greater than 2,000 km^2, offers more durable conservation value. As anathema as a comparison between the conservation values offered by different parks may sound, we have to recognize the fact that most of India's wildlife and wilderness areas will just not make it past the next 20 years. Some prioritization and effective management of at least a few select areas is better than losing everything! As it is, a good number of the protected areas in India, like Karera, today only exist on paper and have little or nothing by way of budgets, security, park infrastructure, or research capabilities.

Kanha National Park is already connected by continuous forest to Achanakmar National Park near Amarkantak, the source of the Narmada river. The forested Maikal hills are also connected to the Park to allow for the dispersion of wildlife. The nearby Phen sanctuary is in the process of being added to Kanha. The forest adjacent and connected to Kanha thus adds up to an area of 5,000 to 10,000 km^2. It is only in such a large area that viable populations of large mammals like tigers and a representation of much of central India's flora and fauna can exist. Some dozen tigers in Sariska and Ranthambhor National Parks may not be viable 20 years hence (in fact, poachers, elitist over-exposure, and publicity have already taken care of this problem). Only professional Forest and Wildlife Service cadres, preferably with idealistic enthusiasm and dedication to the job, can sufficiently harden the environmental management of Parks like Sariska, Ranthambhor, Eturnagram, Pakhal, Mundanthurai, and Tadoba, and the large number of smaller protected areas away from the public eye.

Forest corridors need urgent protection around Kanha before development catches up, even as the grazing populations have started rising (with rising human populations). Poaching has been greatly controlled in Kanha, but animals from Kanha are regularly being killed outside, and there is a flourishing animal trade market in Baihar. If the tiger is to be saved, a stronger effort is needed for greater Kanha than for all the small Parks combined. For other reasons, and other animals, conservation efforts are needed at the small Parks, too. But these should be supplemental to creating a few key park complexes, which are large, well-managed, and funded, and politically inviolate.

Another Park in Madhya Pradesh, Bandhavagarh National Park, has now been extended to include Pan Patha Sanctuary. Like Kanha, Bandhavagarh is also surrounded by degraded buffer forests. Bandhavagarh can easily be extended to a size of more than 2,000 km^2 by including the Vindhyan hills and extending the Park boundary all the way to the Johilla River. Any extension will involve the removal of several insular villages. Given that the Park authorities have not been able to remove six villages in the current Park area for more than 10 years, much more will have to be done to design a successful rehabilitation scheme—perhaps by learning from the Kanha example managed by H. S. Panwar in the 1970's. Rehabilitation must be done sensitively with the participation of villagers to raise their standard of living, and who would be glad to move because of crop damage.

Panna, at some 540 km^2, is small compared to the other two Madhya Pradesh Parks. However, Panna is already de facto, connected to two sanctuaries in the west, going all the way to Jatashankar. The forested Vindhyan hill range extends virtually all the way to Sagar in the west and to Ajaigarh and Kalinjar in the northeast, so further extension is possible. A larger Panna can allow for the dispersion of wildlife generated by improved conservation in the core area. This will allow Panna to harbor much larger animal populations than it does currently. Village resettlements from the core area will also help. Already the largest animal populations in Panna are in the Hinauta Range, now freed of cattle and insular village populations.

Those examples from Madhya Pradesh are not the only cases where large parks can be created in India. A complex in the south, including Nagarhole, Bandipur, Wyanad, Sigur, and Mudumalai, is a distinct possibility, where management of the larger area as an integrated unit would be much more effective in combating poaching and for managing tourist impact. Two critical corridors, which need urgent protection, are the Rajaji-Corbett corridor in Uttar Pradesh and the Mahananda-Buxa-Manas corridor spanning West Bengal and Assam. In both cases, the creation of wildlife corridors will allow for uninterrupted dispersion of animal populations for more than 300 km. This will help protect the rich biodiversity of the Siwaliks and allow the flora to regenerate by permitting large mammal migration. Perhaps someday, the Ranthambhor Aravallis can be connected to the Kuno Palpur Park being created for lion translocation in

the Morena district across the Chambal river, as well as, even to Madhav National Park. Larger parks could also be built around Pench (to include forests in Maharashtra), Bori and Satpura in Madhya Pradesh, Nagarjunasagar in Andhra Pradesh, Dudhwa in Uttar Pradesh, and Palamau in Bihar. Perhaps the new States being created—Chhatisgarh, Vananchal, and Uttarakhand—will showcase Indravati, Palamau, and Rajaji Parks, respectively, as their most important conservation projects and tourism sites. With a half dozen large park complexes across India receiving strong scientific and management attention, at least key Indian animals and ecological processes can be protected. Additional conservation efforts can then work at improving biogeographic coverage from among the other 500 parks and sanctuaries.

A further opportunity to increase the sizes of selected parks is to develop parks and park management across national borders. How Valmiki National Park would benefit from sharing the strong management and tourism inflow from Chitwan National Park in Nepal! Greater cooperation between the park mangers at Chitwan and Valmiki would go a long way in reducing the large-scale trans-border poaching currently taking place at Dudwa, Katerniaghat, and Valmiki Parks. Similarly, Dudhwa, Buxa, Sunderbans, Kanchenjunga, and Manas can all benefit from trans-border park management and cooperation between India, Nepal, Bhutan, and Bangaladesh. Perhaps this idea can be undertaken as a project under the auspices of the South Asian Association for Regional Cooperation. The development of a few international large parks will prove to be a strong enough excuse to promote ecodevelopment projects, as well as to augment the tourism infrastructure around the parks. Such parks may also be able to access international funding and so free up resources for more difficult and purely domestic parks.

A large national park in the public eye offers greater protection to wildlife. To a State government, in lieu of timber revenues, the park increase can be justified by the development of tourism. Tourism can then be dispersed over the larger park area, as has happened at Corbett Park. The creation and conservation of larger park complexes will then at least arrest the imminent possibility of the extinction of large mammals and representative biogeographic habitats. Ideally, India would conserve all protected areas well, but we have seen where such a policy has gotten us, with most Indian protected areas reporting inadequate management resources and attention. The current policy of general and unfocused conservation will continue to suffer from a combination of poaching, grazing, encroachment, mining, dereservation, timber theft, terrorist takeover, and so on.

Employment

Tourism can create a significant number of jobs outside a park—but clearly not enough to absorb the vast force of unemployed and underemployed people. What then, for local people who do not benefit by exclusion from resource use and misuse from neighboring parks?

The simple answer gleaned from experience the world over (witness South Africa and the Conservation Corporation) lies in private forests being raised on lands adjoining these Parks. The generation of these forests will create employment as well as benefit wildlife, effectively increasing the protected areas. These lands can be misused for shikar (culling or legitimate sport-shooting by sportsmen), but adjoining farmlands are already being so misused. Here is another role for wildlife tourism. Private forests managed for tourism purposes would generate far more revenue (and far less problems) for the owners if they are used for tourism rather than for shikar.

The controversial issue of shikar can be handled by letting private individuals or organizations offer shikar, or legitimate sport-shooting, on a piece of isolated forest that is raised from ruin and degradation (to be certified by an apolitical, environmentally supportive committee to be set up for the purpose) or started from scratch. No one can then complain of the depletion of wildlife by legitimate shikar. If sport-shooting raises revenues for the government, and introduced wildlife populations actually increase (witness the healthy populations of Indian animals and birds in Texas, where they have been introduced), then there is no reason not to allow it. There is nothing wrong with parting film stars and politicians from their money, if that money can be put to good use. The alternative is the recurrence of illegal poaching, as has recently happened in Jodhpur, where a Bollywood (India's Hollywood) film star was caught poaching Blackbuck. As India's experience shows, poaching can be driven underground—it cannot be stopped. Otherwise, with the ending of legitimate shikar in India in the 1980's, game populations would have increased substantially in the old shooting blocks! Whether India is ready to allow legitimate, regulated sport-shooting or not is obviously a question for a wider audience and for State governments such as Punjab, Haryana, and Rajasthan, which have their own views and rights on the issue, given farmers' lobbies against crop damage.

Now, anyone can buy a small patch of land and raise a forest. This would take 20 years. Here is a controversial suggestion, particularly in light of the experience of the wasteland development exercise in India, where lands have been given away indiscriminately to the politically connected, and diverted for nonforestry purposes. Degraded forest lands outside parks could be given on 20 year leases to a few, select private parties for rehabilitation and for the development of tourism. These degraded forests could be raised in 5 to 10 years because the rootstock is intact. The government could stipulate the employment of local people for tourism and forestry works. Private silviculture could employ as many people as forest department silviculture. Tribal and local populations could be accommodated preferentially in such schemes. The renewal of leases, which would be monitored by outside experts, would be conditioned on the success of such projects in raising forests and generating employment. Rather than being used for harvesting timber, such forests could be used exclusively for the sustainable harvesting of nontimber minor forest produce.

As in all such schemes, transparency in the selection and regulation of the private parties is absolutely critical. Perhaps only those parties who are strongly capitalized, or who offer grants as part of corporate giving for rural development (again, to be monitored by the likes of environmentalists and auditing firms), could be considered. Locally influential people, landlords, VIP's, and commercial nongovernment

organizations could simply be excluded by the financial and operational commitments involved.

Tourism Helps

Tourism, while being a nuisance for the forester, actually helps conservation. Tourism generates employment for guides, restaurateurs, hoteliers, local shopkeepers, mechanics, and so on. Further, tourism helps create a local constituency that is monitoring wildlife and effectively patrolling roads, rest houses, and whole forest blocks. Guides receive training from the Park authorities. They become champions of conservation in their villages. A network of information is set up in adjoining areas about the main mammals and the health of the forest. Ecological information is disseminated outside the Park. This is already happening at some Parks such as Ranthambhor, Corbett, Bandhavagarh, Kanha, and Nagarhole. These are the same Parks about which information is most easily available and where poaching is immediately highlighted. No information is available on the rampant poaching and timber theft at Palamau, Katerniaghat, Suhelwa, Bhitarkanika, Valmiki, Bhimgad, and Hazaribagh.

Tourists should be asked to pay fees in excess of the nominal ones currently being charged. This process has already begun at Corbett Park where last year's entry fees alone generated Rs. 84 lakh ($200,000). These fees should be earmarked into ecodevelopment funds or park budgets for purchasing land in critical buffers and corridors. Such funds could also be used for rehabilitation of insular villages and paying for crop damage. Further, these monies could be used to install radio communication networks for park management. India will soon be covered by a nationwide radio trunking network, which should cover many Parks in its purview. Finally, such funds could help Parks procure modern firepower to combat the poachers of today.

Park administration should get out of tourist infrastructure immediately and leave this to the private sector or State tourism departments, thus discouraging park directors from continuing to spend more of their time booking accommodations for all and sundry VIP's. This would also release more funds from limited park budgets for the strengthening of invigilation and control. It is not clear what should be done to the government Forest Rest Houses, which are regularly used by assorted influential people and conservation celebrities. Should they be managed by State tourism authorities and customers charged appropriately? If so, the infrastructure would definitely be improved, though the clientele might have to be restricted by the size of the facilities.

The publication of educational materials and maps for tourists helps make parks more approachable. In this regard, the maintenance of forest roads for wildlife viewing is not harmful. The same roads that are maintained for tourism are also used by forest guards. Tourism can also be developed in the buffers to increase vigilance there and to take pressure away from the central attractions. Tourism at each park should be restricted to its carrying capacity and identified and publicized in advance so there aren't long queues at park entrances (and no black market for entry permits either!). To make tourism benign and beneficial, it must be emphasized, however, that park authorities have to plan for effective dispersion of tourist pressure and regulation of tourist behavior.

Celebrity Parks

No park or tiger belongs to some local personality or Delhi celebrity conservationist. There should be no incidence of visiting celebrities who override park management for commercial interests. When animals are too frequently exposed to human beings, they lose their fear. After the first book has made him or her a celebrity on the party circuit, the purveyor of fashion moves to another animal collection. When the public spotlight turns away and the poachers come, the tamed animals are slaughtered. This is simply to say that conservation should not be allowed to become personality based. Forest Rest Houses should not be managed for VIP's and their entourages. People desperate to see a tiger should be encouraged to go to zoos, where enough animals in India suffer the depredations of ill-mannered visitors and languish in the confines of terrible conditions. Forests and parks should not be managed for tiger viewing—no tiger baiting at Kanha or anywhere else. Visitors should be encouraged to ignore the tiger and think instead of beetles and honey badgers—less attractive animals to some, but equally important in the food chain! Defocusing the tiger may be a way of eliminating the nonserious MTV (Music Television Channel) generation, who are so far removed from the dedication of the generation of early Indian naturalists such as Salim Ali, R. S. Dharamkumarsinhji, E. P. Gee, P. D. Stracey, and Fatehsinhrao Gaekwad.

Government policy and the serious media can help by down-playing the media hype or encouraging and "toadying" to self-styled, instant celebrities with handlebar mustaches and great grey beards, who declaim from five-star convention halls about "my tigers" or "my park." Tiger poaching and loss through crony/elitist celebrity policies pose a real danger to animal survival. This is compounded when the humble villager, the private idealistic conservationist, the field forester, and the professional official are neglected, downgraded, and marginalized.

Ecodevelopment

The presence of a national park may help develop the local telephone network, power supply, water supply, rail connections, air connections, and so on. This is not intrinsically a bad thing. Local people may be told why they are a focus of public investment, which should also include the development of animal husbandry, bee keeping, cottage industries, and so on. The idea is to sell the park to the surrounding population. The park should be seen as a magnet for nonthreatening, environmentally sensitive development rather than an inhibitor. Well-planned and participatory rehabilitation schemes, which increase the welfare of the displaced, should be seen as an opportunity to use the excuse of the park to enhance the quality of life of remote, forest-dwelling communities. Unfortunately, most rehabilitation schemes have not involved the input of the people concerned, unlike the highly successful Kanha resettlement and the ongoing Kuno-Palpur project. Consequently, rehabilitation schemes in Indian parks have largely stalled, and spurred by all-too-critical environmental activists, the very notion of rehabilitation has acquired negative connotations. It is as if unsustainable lifestyles of ever-burgeoning human and animal populations, such as those of the Gujjars at Rajaji

National Park, are simply not deserving of change and improvement, even if relocation is to become participatory and generous.

Park Management: Getting Indians Involved

Corporate or foundation sponsorship for selected parks is a possible method of raising funds for park infrastructure, insular village relocation, local employment generation, and land purchase for corridors. Sponsors of an "Indian Wildlife Fund" could be given tax breaks (as would accrue to any charitable contribution in India), rights to publicize their sponsorship, and the standard use of selected noncore Rest Houses for hosting employees. Given the modest annual budget of Project Tiger, there should be no trouble in raising at least as much money from private initiative every year.

Advertising presents many opportunities. Sponsors could publicize their contribution to conservation as part of their regular media advertising. Alternatively, they could donate part of the sales on any product to the conservation fund, such as various credit card companies are doing worldwide. This might even help them lift sales on their products, and so help them contribute more. Finally, sponsors might purchase the rights to sell 'Corbett Tea,' 'Sunderbans Honey,' or 'Palamau Amla,' with the revenues going to the respective parks. Distasteful as the thought of branding the names of our National Parks might seem, it could raise revenues for conservation. Given the seriousness of India's conservation problems, and the fact that most of our forests won't see the next 20 years, this is a small aesthetic price to pay for conservation.

Private sponsorship could pay for annual prizes for forest guards who arrest poachers, compensation for crop damage and cattle killed by predators, forest and wildlife officials killed by poachers (as has recently happened in Palamau and Kaziranga), and vehicles for anti-poaching activities. Sponsors can motivate forest guards by providing employment to the relatives of those guards who are injured or killed by poachers. Some private sector type management practices of rewarding merit can also be instituted into normal park administration, which today often penalizes the ranger who makes reports of poaching or timber theft. The adoption of a rehabilitated village, or a troublesome village outside the park, by a private sponsor supporting conservation could also go a long way in easing pressures on forest administration. It is heartening to know that the Corbett Foundation in Ramnagar has actually started doing these very things.

Any relationship with corporations or foundations should be started up centrally, either by the Wildlife Institute of India or Project Tiger. Further developments can take place locally. This is to ensure transparency and the regulation of the relationship at a senior level. Companies from a number of sectors like tea, coffee, tourism, airlines, hotels, as well as local manufacturing, will be very glad to join up. Examples are: the Ballarpur group (with extensive paper interests, and now, strong support for the Wildlife Preservation Society of India, which is doing pioneering anti-poaching work); Godrej (which has been long associated with World Wildlife Fund—India); the Tata Group (Tata Iron and Steel Company can support Dalma, just as Tata Tea supports Eravikulam in the south); Dabur, Williamson, and Magor (who protect the white winged wood duck in Assam, and in addition, have gardens near Kaziranga, Manas, Jaldapara, Gorumara, and Buxa); the Claridges Hotel group (with a stake near Corbett); Indian Hotels (Khajuraho Hotel near Panna, Sawai Madhopur Hotel near Ranthambhor, Sasangir Lodge near Gir); Indian Drugs and Pharmaceuticals Limited and Bharat Heavy Electricals Limited (plants at Rishikesh can adopt Rajaji forests, from which land was excised for them); East India Hotels (hotel near Panna, another coming up at Rajgarh, Chattarpur); Air India, Welcome group (Keoladeo Ghana is near the Agra hotel); Sita Travels; the United Breweries Group (which has apparently bought a game ranch in South Africa because private forests are not possible in India); the Indian Tourism Development Corporation (lodges at Periyar and Bharatpur); the Sandur Manganese Group; Modi Xerox (the Kashipur plant is near Corbett), and so on.

All such monies raised should be constituted into an endowment component and a project component. The former would be administered centrally (for example, by the Wildlife Institute of India in Dehra Dun), the latter locally by the park director and a local management committee comprised of prominent citizens, conservationists, ecotourism operators, nongovernment organizations, representatives of the district administration, local corporates, scientists, academics, and so forth.

In similar fashion, local schools and colleges must be encouraged to develop strong connections with neighboring parks. School children should be given concessional entrance and programs arranged for them. School children may raise money with campaigns for park projects. School children in Delhi have just participated in a very effective campaign to reduce the use of firecrackers during the Diwali festival. Such energy by youngsters, supplemented by well organized visits to parks, rather than to zoos, could be effectively channelized to support conservation initiatives across the country.

Finally, the practice of appointing respected and local resident conservationists as Honorary Wildlife Wardens should be encouraged, to the extent that this supports park authorities. This was done in the 1980's and had encouraging results in some parks, with excellent work done by genuine naturalists, until the usual political lobbyists and socialites took over.

Conclusions

The suggestions, which have been discussed, have some features in common. They are pragmatic rather than being ideologically motivated, they involve greater participation by the Indian public for whom these areas are being managed, they recognize the role of private enterprise and initiative (many forests in India have survived because they were once private property!), and they recognize the inevitability of faster economic development in India, which will bring both more destruction and more affluence. This development cannot be stopped given the large population that India has to support; it can only be harnessed to minimize the environmental impact.

Economic theory (the Ricardian Theory of Rent) suggests that consumers (and governments) spend more in the present if they feel their revenues will increase in the future. The imperative for conservation stems from the same economic point of view. India will be prosperous in the future. A prosperous India can afford to save its forests and wildlife. Prosperous Indians will value wildlife. Hence, India should invest in conservation today. This is an elitist view from the public point of view because scarce lands can be used for grazing and to produce food. However, because Indians of all walks of life invest in their children's education for the same reason as India invests in conservation, it is time we discarded this rejection of elitism.

The ideological baggage of the last 50 years has to be rejected to accept elitist thinking on Indian conservation, just as it is accepted in justifying costly investments in Indian defense, space research, and technological development. These are investments undertaken by a poor country so that it will not always be poor. True, funds are needed for investments in the social sector. These funds, critically needed in India, should come from the deconstruction of the Indian state, which currently manages (for lack of a better word) more than half the economic assets of this country, ranging from the manufacturing of watches and luxury automobiles to the running of hotels and airlines. Just as the private sector must eventually take over these businesses that it can manage better, so must private initiative (scientifically regulated) be allowed to help in the management of India's natural resources.

Leaving the management of India's protected areas outside the ambit of India's civil society will continue the same decay and destruction that has been witnessed in all areas of Indian life that the Indian government system manages. The same Indian economic system, which is unable to deliver clean drinking water, health care, or electricity, will not be able to deliver on a task as critical and complex as the conservation of India's still-rich biodiversity.

Before questioning some of the aforementioned suggestions on involving private initiative in conservation, we must recognize where Indian conservation is today. Orang and Pobitra Sanctuaries (where the Great Indian Rhinoceros is now extinct) in the state of Assam, and Gahirmata and Bhitarkanika Sanctuaries in the state of Orissa, have been settled with immigrants to build political votebanks, and our shouting brigade of unsustainable armchair environmental activists that protests 46 mangrove stumps in the Gulf of Kachchh has kept quiet about such politically supported vandalism.

Manas National Park in Assam, a United Nations Educational, Scientific, and Cultural Organization World Heritage Site, is just limping back after having been taken over by insurgents and most large animals slaughtered. Kaziranga National Park has suffered from its annual floods. Animals seeking refuge in the neighboring Karbi Anglong (formerly the Mikir North Cachar) hills have been slaughtered according to what is now an annual routine.

Indravati National Park in Madhya Pradesh, Valmikinagar National Park in Uttar Pradesh, and Palamau National Park in Bihar are virtually preserves of terrorists. The Forest Department, for all its professionalism and custodial efforts, has been made to lose control by the failure of governance of the Indian state. Developments in these outstanding forests now no longer even make the news. A third of Melghat National Park has recently been dereserved. Even a well protected park like Corbett National Park has suffered from repeated poaching and land diversion to a hydro project.

Underlying all this destruction is the Indian political establishment, which will continue to settle immigrants on forest land and dereserve forest land for assorted ill-conceived industrial projects instead of applying existing environmental regulations governing land use. Regardless of election manifestoes, all democratic, electorally sensitive political parties in India will make the same transactions that took place in Orang and Gahirmata, and in scores of wilderness locations all over India.

In conclusion I ask you, would private Indian initiative, invigilation, and involvement be that bad after all? In the fiftieth anniversary year of Indian Independence, wouldn't it be fitting if Indian people (as distinct from the Indian state) finally assumed the responsibilities associated with their cherished democratic rights? The most precious Indian right to wilderness must increasingly be accompanied with responsibility for its management.

Wilderness Climate Change Data Collected by the Bureau of Land Management in the Western United States

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Abstract—From 1991 until 1995 the USDI Bureau of Land Management conducted a study (Intermountain Wilderness Area Ecosystem Study [IWAES]) to assess the potential for climate change on Western United States wilderness and wilderness study areas. Data were collected under a uniform protocol for surface water chemistry, stream macro invertebrates, annual vegetation, weather, and air quality. The weather and air quality measurements were collected with a unique aerometric station designed for wilderness conditions operating on solar power. In this paper, these stations are described, their geographic locations shown, and data compared with information from other United States air quality programs such as the National Atmospheric Deposition Program and the United States Environmental Protection Agency National Dry Deposition Network (NDDN). This comparison demonstrated that IWAES data, although collected with less sophisticated and less expensive techniques than the other networks, was comparable to those programs and in the case of NDDN, had higher data capture rates. Finally, recommendations for future wilderness monitoring are made from the standpoint of the IWAES experience.

In 1991 the Bureau of Land Management Wyoming State Office completed a project to assess wilderness ecosystem values (Riebau and Sestak 1990) and recognized that wilderness values needed to be measured in a systematic manner (Bruns and Wiersma 1991; Kononov and others 1994). In response to this, the Intermountain Wilderness Area Ecosystem Study (IWAES) began in 1991 as a project under the United States Global Change Research Program (Committee on Earth and Environmental Sciences 1990). Figure 1 shows the approximate locations of IWAES study sites. Within IWAES, a number of environmental measurements were accomplished including water quality, water quantity, aquatic ecology and biology, vegetation, air quality, and meteorology. All measurements were taken under strict, uniform program protocols so that measurements could be compared at each site. Study sites were chosen for their applicability to the study, ability to be used with minimal impact to wilderness, availability of local specialists to complete the measurements, and support to management objectives. Although standard methods were used to the extent possible, in some cases entirely new technology had to be developed. One of the new developments was a solar-powered station for air quality and meteorologic measurements.

Potential sites for the IWAES network were required to meet several criteria. They were required to be areas managed by the Bureau of Land Management (BLM) as wilderness or under the interim management program as sites

Figure 1—Approximate locations of Intermountain Wilderness Area Ecosystem Study sites.

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recommended to become wilderness. Areas chosen were to be pristine and free from nonconforming or unallowed uses. Additionally, areas were chosen to represent a large number of the ecoregion or ecosystem types found within the Bureau of Land Management (Bailey and Hogg 1993). Unique to this study was that local BLM office specialists conducted all ongoing program measurements. As sites were established and equipment installed by the ESTC staff (Environmental Science and Technology Center, a BLM/ Colorado State University cooperative studies center transferred to the National Biological Service in 1993 and disbanded in 1996), program specialists at the local site office were trained to operate the equipment and perform the routine measurements. All samples (such as water, air quality, biological) were then sent to central project laboratories for analysis.

Methods Used in IWAES

Air Quality and Meteorology

Within the United States a number of companies now offer weather stations that can be operated in remote locations using solar energy to power them. However, measuring the air quality and the depositional environment (for example, rainwater chemistry) in wilderness and remote areas is a more difficult challenge than a weather station. Traditional air quality monitoring devices normally operate as continuous samplers requiring line power (120 volts, 60 Hz in the United States) within a controlled environment shelter. To meet the needs of the IWAES program, a single station was required for air quality and meteorology measurements that not only operated on solar power, but was low maintenance, could be delivered to remote areas, and produced minimal surface disturbance (to meet wilderness guidelines).

From these requirements, a station (fig. 2) was designed that used traditional meteorologic monitoring instruments and air quality measurement techniques that produced monthly integrated results rather than continuous measurements based on work done by Environmental Protection Agency in the National Dry Deposition Monitoring Program (Edgerton and others 1991). To support these instruments a new tower was designed. Table 1 lists the attributes or parameters that were measured by the station and the techniques of measurement used (Smith and others, in preparation). Because the air quality instruments must be serviced monthly, the data is logged at the station in a solid state storage module, which is also exchanged monthly, rather than using a satellite or other direct communication link.

Vegetation

The focus of the IWAES vegetation program measured herbaceous (especially annual) plants for dominance, frequency, and species diversity trends (Hazlett 1993). Woody species were less emphasized because it is less likely for perennial, deep-rooted species to show a rapid response (within 5 to 10 years) to slight climate or air quality changes. Vegetation measurements at a participating IWAES site consisted of initially establishing three transects in each of two areas.

Three sets of replicate transects were established in each area to enable meaningful statistical analyses. One set was in a mesic area and a second set was in a more xeric or relatively drier area. Transects were measured at least once per year, near peak flowering of annuals, to collect data on ground cover, canopy cover, species occurrence, species counts, and species dominance. Complete plant species inventories were also taken from each transect area (6 x 25 m) for comparisons and to contribute or to initiate plant species inventory lists for participating sites. After the first several years of data analyses, a third set of "indicator species" transects were installed at some sites to monitor individual plant populations in more detail. Indicator species were defined as plant species sensitive to climate change and included infrequent, threatened, endangered, relict, or keystone plant species (Turner and Brown 1994).

In addition, soil samples were taken from each transect location to characterize soil type, texture, and soil nutrient content. Data from the vegetation monitoring program were

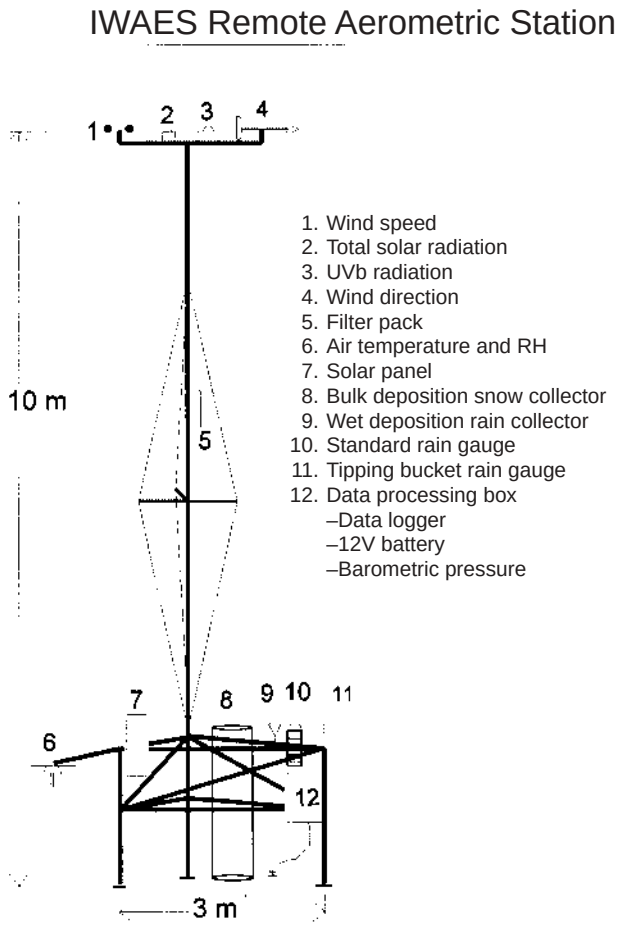

Figure 2—Plan drawing of Intermountain Wilderness Area Ecosystem Study aerometric station.

Table 1—Intermountain Wilderness Area Ecosystem Study aerometric station measurements (Smith and others 1994).

Attribute[a]	Sampling equipment	Sensor scan	Range
Wind speed	MetOne 014 wind speed sensor	15 sec.	0-50 m/s
Wind direction	MetOne 024 wind direction sensor	15 sec.	0-360 deg.
Air temperature	MetOne 083C-1 RH/air temp. sensor	15 sec.	–50 to +50 C
Relative humidity	MetOne 083C-1 RH/air temp. sensor	15 sec.	0-100% RH
Barometric press.	MetOne 090C pressure sensor	15 sec.	16-32 Hg
Solar radiation	Licor 200SZ pyranometer	15 sec.	400-1,100 nm
UV-B radiation	Yankee UVB-1 pyranometer	15 sec.	280-320 nm
Soil moisture	Sensit GT1 soil moist/temp sensor	15 sec.	10 & 50 cm
Soil temperature	Sensit GT1 soil moist/temp sensor	15 sec.	10 & 50 cm
Rainfall	MetOne 099C tipping bucket	15 sec.	NA
Rainfall (winter)	Belfort 5-400 non-recording gauge	Monthly	NA
Deposition chemistry	USGS-style snow tube (snow)	Monthly	NA
Deposition chemistry	Hubbard-Brook style collector (rain)	Monthly	NA
Particulate sulfate	3-stage filter pack	Monthly	NA
Particulate nitrate	3-stage filter pack	Monthly	NA
Nitric acid	3-stage filter pack	Monthly	NA
Sulfur dioxide	3-stage filter pack	Monthly	NA

[a]Deposition chemistry includes monthly precipitation weighted means for CA, Mg, K, Na, NH_4, NO_3, Cl, SO NH_4, PO_4, and cation/anion ration.

analyzed to determine trends and changes in community structure. Species composition of the mesic and xeric transects were compared to determine if species distributions or densities are shifting from one area to another.

Water Resources (Quality and Quantity)

The objective of the IWAES water sampling program was to obtain a comprehensive picture of the physical and chemical nature of the water at the remote IWAES sites (Sulzman and Wolf 1993). These characteristics were particularly chosen as those that might change in response to atmospheric deposition of chemicals under a changing atmospheric environment. Using the combination of on- and off-site analysis techniques, referenced in table 2, the water sampling program was instrumental in eventually determining site-specific hydrologic "baseline conditions." It is against these conditions that future changes in water quality were proposed to be compared and a determination made with regard to how changes in climate are reflected by changes in water quality (Hem 1985).

Aquatic Biology (Limnology)

Simultaneously, with the collection of water quality grab samples at each field site, representative samples of

Table 2—Intermountain Wilderness Area Ecosystem Study water resources measurements (Sulzman and Wolfe 1993).

Attribute	Sampling equipment	Analysis method
pH	HDPE[a] sample bottle	Electrometric
ANC[b]	Field chemistry kit	Digital titrator
Conductivity	Conductivity meter/probe	Analog read out
Pb, Ca^{2+}, Mg^{2+}, Al^{3+}	HDPE sample bottle	ICP[c]/AA[d]
K^+, Na^+	HDPE sample bottle	AA
F^-, Cl^-, NO_3^-, PO_4^{3-}, SO_4^{2-},	HDPE sample bottle	IC[e]
NH_4^+, SiO_2	HDPE sample bottle	Calorimetric
DIC, DOC	HDPE sample bottle	NDIR[f]
Dissolved oxygen	Field chemistry kit	Winkler method
Benthic macro invertebrate	Modified surber (bottom)	Community structure
Periphyton	Periphyton sampler (Wildco)	Community structure
Stream discharge	Flow meter	Mid section method
Water temperature	Temperature meter and probe	Analog readout

[a]High-density polyethylene.
[b]Acid neutralizing capacity.
[c]Inductively coupled plasma.
[d]Atomic absorption spectrometric.
[e]Ion chromatograph.
[f]A combustion infrared method.

the aquatic macro invertebrates that existed under those hydrologic conditions were collected. A 1 ft^2 (929.03 cm^2) modified Surber Stream Sampler was used to collect three aquatic macro invertebrate samples on each visit. The square frame of the sampler was placed over a suitable substrate in the stream. As rocks that comprise the substrate were brushed, the current carried the benthic organisms that were dislodged into a nylon mesh bag attached to the stream sampler. The bag was washed several times to concentrate the sample in the bottom. The contents of each sample were then transferred into double-bagged Ziploc bags with identification labels and preserved in formaldehyde. The samples were then shipped to the Environmental Science and Technology Center at Colorado State University (ESTC/CSU) in Fort Collins.

At ESTC/CSU, the macro invertebrates were picked from the sand and gravel in each sample and sorted into taxonomic groups. These sorted samples were stored in vials containing 80 percent ethanol until the organisms were identified by the project aquatic biologist/taxonomist. After the organisms were identified, they were pooled into their own vial, labeled, and stored with the voucher collection. A representative voucher collection was created for each successive season. Next, taxa names, number of individual organisms counted in each taxon, life stage of each taxon, and identifier's name were entered into the IWAES database. Reports were generated for each site that included a tabular summary of these data along with (1) the total number of organisms in the sample, (2) the total number of taxa in the sample, and (3) a diversity value. The Shannon-Weaver Diversity Index was then calculated for each site and included in the IWAES database (Smith and others, in preparation).

IWAES Data Comparisons

Atmospheric Deposition

IWAES data on atmospheric deposition was compared to data collected under the National Atmospheric Deposition Program/National Trends Network (NADP/NTN). The collection methodology of the IWAES program used techniques parallel to those used by the U.S. Forest Service at wilderness sites in the Jim Bridger Wilderness in Wyoming. This collection technique uses simplistic methods of collection—Hubbard Brook style samplers that are chemically nonreactive collection bottles and funnels to collect rainfall and large tubes lined with chemically nonreactive watertight liner bags to collect snow. Generally, samples are removed once per month. One difference with IWAES collection techniques compared to those employed by the Forest Service was that IWAES samplers were shielded from sunlight in an attempt to keep them more chemically stable over the monthly exposure period.

At the Glacier Lakes Ecosystem Experiment Site (GLEES), there are two NADP/NTN collectors located near (within 3 km) an IWAES aerometric station (NADP 1996). This affords a fortuitous opportunity to directly compare IWAES deposition data to that of two NADP sites while also comparing these sites against each other. If the correlation of the IWAES precipitation concentration data are as good as that between the two NADP sites, then it can be judged that IWAES data on deposition are reliable if the station was operated correctly. The period chosen for comparison was August 1994 through July 1995. This period was chosen because it was the most complete data record for the months the aerometric station was operated at GLEES. Data from the IWAES site at GLEES were analyzed against data collected by the NADP/NTN sites for SO_4 and NO_3 (figs. 3 and 4). In this section, figures and tables are coded as: GLEES stands for the Glacier Lake NADP, Brooklyn stands for the Brooklyn Lake NADP site, and SNO stands for the Snowy Range IWAES site.

The IWAES site (SNO) compared well with both sites but much more strongly with the Brooklyn Lake NADP site, with which it is placed within a 50 meter proximity. The Pearson's Correlation Coefficient for these data sets was 0.89/0.91; between the IWAES site and the second NADP at GLEES (located less than 2 km distance) the Correlation Coefficient was only 0.82/0.81, but the two NADP sites were slightly more highly correlated with a coefficient of 0.95/0.90 (table 3). Because a coefficient value of 1.0 would indicate perfect Correlation Coefficient, or both being perfectly correlated, the values obtained are exceptionally good for NO_3 and SO_4.

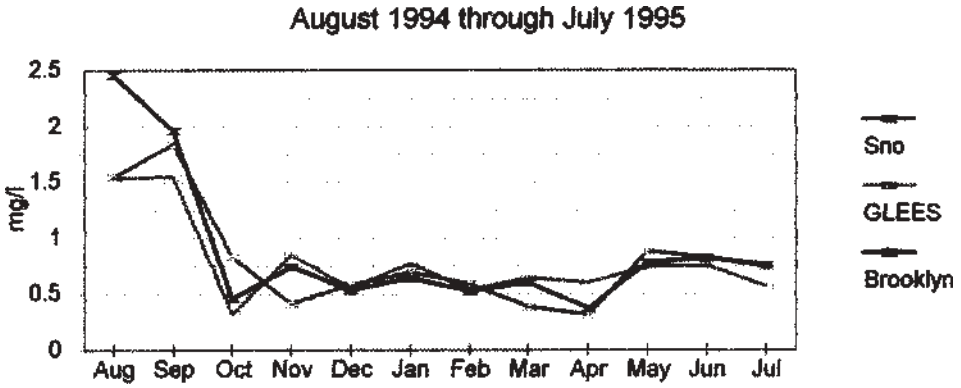

Figure 3—NO_3 concentration comparisons.

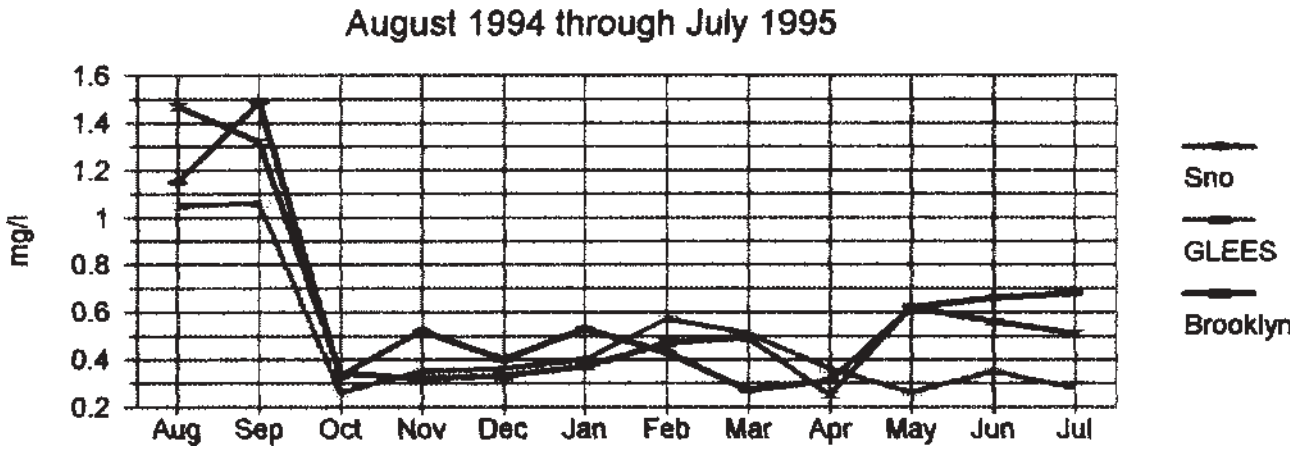

Figure 4—SO_4 concentration comparisons.

Ultraviolet Radiation

Ultraviolet radiation is of high concern because of its potentially adverse impacts on biological systems (Franklin and others 1991). The IWAES project tested a number of commercial meters and chose the Yankee Instruments, Inc. YES UVB-1 meter, which is simple to operate, sturdy, and accurate for a broadband meter (performing an integrated measurement from 220 to 360 nanometers wavelength of the solar spectrum or that part most biologically active). Measurements of ultraviolet radiation are not simple due to confounding factors not the least of which are the tiny amounts of energy that actually strike the surface of the earth in this bandwidth, the confounding nature of clouds, and the amount of UV-B absorptive materials in the atmospheric column above the sensor such as particulate matter and ozone (Green and others 1973).

To assess the accuracy of IWAES UV-B data, a theoretical test was made (fig. 5). In this example test, the output of an IWAES station located in Fort Collins was tested against the output of a theoretical model. This was completed for a summer day without clouds, an ideal condition for measurements. Data input into the model included the latitude and longitude to the site to allow correct computation of solar angles, information from satellite observations of ozone concentrations above the site, and values for particulates and humidity. The relationship between the output of this two-stream model and the YES sensor as deployed in IWAES (table 4) is generally good both for a single-day observation and for monthly values (Qu and Stephens, in press).

Agreement was good except during early mornings and in the evenings when scattering in the atmosphere deflects energy away from the sensor and energy readings are lower than model predictions. In months when there is a low solar angle, this problem is again exacerbated and the values for IWAES measurements are not very comparable to model results. This is an inherent and recognized fault with broadband radiometers as deployed in IWAES but does not impair their ability to provide general trend and maximum intensity information.

Dry Deposition or Acid Gases

Acidic gas and particle measurements in wilderness areas are an important part of the air pollution threats to wilderness. These types of pollutants have potential to harm vegetation and cause adverse impacts to surface water bodies. They are also an important aspect of global change in that increases in acidic species would signal a negative change in the atmosphere of the earth due to the increased heat trapping in the troposphere among other consequences.

Table 3—GLEES NADP/NTN sites compared with colocated Intermountain Wilderness Area Ecosystem Study site for precipitation (August 94 through July 95).

Precipitation analytes	Pearson's	R-squared value	Pop. variance	
NO_3				
SNO versus Brooklyn	0.890449	0.792988	SNO.	0.1941
SNO versus GLEES	.823059	.677427	GLEES	.1322
GLEES versus Brooklyn	.945189	.893382	Brooklyn	.3779
SO_4				
SNO versus Brooklyn	.912814	.833229	SNO.	.1207
SNO versus GLEES	.807754	.652466	GLEES	.0730
GLEES versus Brooklyn	.903186	.815745	Brooklyn	.1422

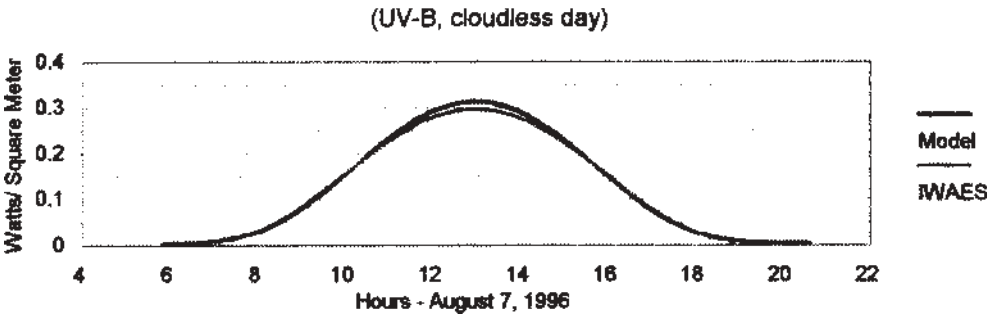

Figure 5—Intermountain Wilderness Area Ecosystem Study UV-B measurements compared to model results.

To address these issues, the IWAES program in its aerometric stations chose to use filter pack techniques based on those of the Environmental Protection Agency's National Dry Deposition Network (NDDN). One very significant difference between the IWAES aerometric sampling system and that of the NDDN was that IWAES filters were exposed for a month-long period while NDDN filters were exposed only for 1 week durations. The exposure period for IWAES filters was based on practical considerations of logistics (travel to the aerometric stations that were in remote locations) and expense (filter pack analysis was in the range of about $100 per filter). For the deployment of the IWAES network, three-stage filter packs were used to measure monthly average concentrations of SO_4, NO_3, HNO_3, NH_4, and SO_2. The first stage contained a teflon filter (Zeflour 2 micron) that trapped suspended particles and aerosols. The next stage was a nylon filter (Nylasorb 1 micron) that absorbed acidic gases such as nitric acid and sulfur dioxide. The final stage consisted of two Whatman 41 ashless cellulose filters that have been impregnated with a 25 percent K_2CO_3 and glycerol solution. SO_2 is oxidized to SO_4 when passing over K_2CO_3, and is retained as sulfate on the filter from which SO_2 concentrations are determined (Smith 1992).

One test for whether IWAES filter pack data has value rests again on if it can be compared with data from other programs, especially the NDDN (Hunter 1989). To compare IWAES and NDDN data, all data must be transformed into monthly values corresponding to IWAES exposure periods. The NDDN publishes its data as weekly averages. These data were reduced to weekly averages for the Centennial NDDN site that is located at GLEES. For the period of the analysis, both the Snowy Range IWAES aerometric station and the Centennial NDDN equipment were located within 25 meters of each other. This data conversion for the Centennial site was difficult because of missing data. The NDDN data received showed missing data from December 1993 until April 1994, missing data from July 1994 until mid October 1994, missing data for the month of December 1994, and sporadic operation throughout the rest of 1995. Data were reduced into monthly values by averaging existing weekly data and extrapolating it for missing weeks following conventions used by the National Atmospheric Deposition Program for rain water samples (Smith and others 1994). Without such transformations, the Centennial NDDN data would be almost impossible to use or interpret. Indeed, data capture was so poor that August, September, and October 1994 values were replaced by those for 1995. Additionally, monthly average data from the IWAES sites at Trigo Mountain, Arizona; Trapper Creek, Wyoming; and Little Wood River, Idaho, were prepared for the analysis. Figures 6 and 7 are simple trend graphs of this data for the species NO_3 and SO_2. The data from the Centennial NDDN (EPA 1992) and the Snowy Range IWAES site show a general agreement both in magnitude and pattern. By analyzing the data with simple Pearson's statistic (table 5), the Snowy Range IWAES site is more closely related to the Centennial NDDN than to other IWAES sites except Little Wood River, although only slightly more so than the site is related to the Trapper Creek, Wyoming IWAES site. In fact, there is really no strong relationship between any of the sites (table 6). In general, however, it would appear that IWAES data is slightly more reliable in this instance for nitrogen species than for sulfur species. This result is different from that of the static filter pack tests completed earlier. The data collected under the IWAES program appear to be comparable in general terms to the NDDN data, but is certainly not an exact replacement.

Table 4—Monthly average UV-B model results compared to Aerometric Station observations in Russia and Alaska (Qu and Stephens, in press).

Observation/ simulation month and year	Fairbanks observations (kj/m^2* day)	Alaska model results (kj/m^2* day)	Yakutsk observations (kj/m^2* day)	Siberia model results (kj/m^2* day)
January 1994	0.25	1.23	0.19	0.98
July 1994	30.28	35.76	—	33.42
January 1995	.23	1.09	.37	1.12
July 1995	30.14	32.18	26.69	27.5

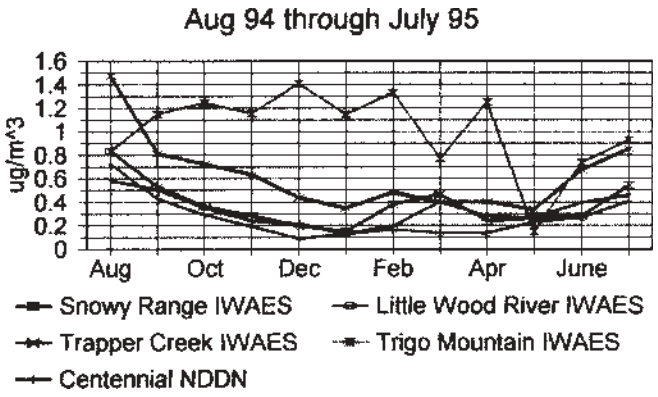

Figure 6—Filter pack NO_3 concentrations.

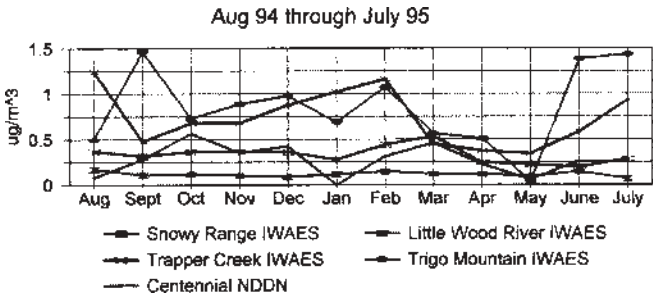

Figure 7—Filter pack SO_2 concentrations.

This result may be due to a number of issues, not only the difference in sampling duration. The data capture at the Centennial NDDN site was generally very poor, with capture rate for samples being less than 50 percent. This made adjustments in monthly averages necessary, with the months of August, September, and October 1994 being replaced with values from 1995 to allow a depiction of what a complete data would be like in a climatological sense. It is not possible to accurately evaluate IWAES data against the Centennial site because of this poor data capture within the EPA program, one which was worse than the IWAES station's performance. However, from the graphical representations of the data, it would appear that at GLEES the IWAES aerometric station worked as a reasonable, lower cost ($25,000 compared to $78,000 in equipment costs alone) surrogate for NDDN.

Conclusions and Recommendations

There is a need for standardized wilderness monitoring data (Brussard 1991; Cole and Landres 1996). This is especially true when one considers threats to wilderness ecosystems and their potential to change wilderness in an adverse manner (Zeller and others 1992). Air quality has long been recognized as a wilderness value of high importance, and air quality related values, as recognized by the Clean Air Act, are an inescapable responsibility for managers of wilderness designated as Class I and potentially a responsibility for managers of wilderness designated as Class II for air quality.

Table 5—Pearson's correlation coefficients for filter pack analytes for Intermountain Wilderness Area Ecosystem Study sites and Centennial NDDN (August 1994 through July 1995).

Site pairs	SO_4	Total NO_3	SO_2	HNO_3
Snowy Range IWAES and Trapper Creek IWAES	0.614156	0.866184	0.214292	0.889779
Snowy Range IWAES and Little Wood River IWAES	.695049	.821255	.257711	.86899
Snowy Range IWAES and Trigo Mountain IWAES	.72275	.043769	-0.0614	-0.15986
Snowy Range IWAES and Centennial NDDN	.584119	.745994	.539373	.873227

Table 6—Regression analysis R squared values for filter pack analytes for Intermountain Wilderness Area Ecosystem Study (IWAES) sites and Centennial NDDN (August 1994 through July 1995).

Site pairs	SO_4	Total NO_3	SO_2	HNO_3
Snowy Range IWAES and Trapper Creek IWAES	0.483093	0.674459	0.313413	0.755143
Snowy Range IWAES and Little Wood River IWAES	.377188	.750274	.04592	.16325
Snowy Range IWAES and Trigo Mountain IWAES	.522367	.001916	.03425	.025556
Snowy Range IWAES and Centennial NDDN	.341195	.556508	.290923	.762525

Monitoring for wilderness ecosystem values must also be developed as an ecosystem approach, including measurements for wilderness values of multiple types (Lubchenco and others 1991; Vento 1992). Currently, measurements of air quality, surface waters, lichens, and vegetation are being taken for wilderness at a number of sites using varying methods. The Intermountain Wilderness Area Ecosystem Study was unique because it developed a program as a network approach for multiple wilderness ecosystem values. Also, it was the only program to assess air quality and ecosystem change on wilderness lands managed by the Bureau of Land Management. Future programs might improve on the IWAES program by developing improved measurement techniques and a more interagency approach. All systems developed, however, must include provisions for quality control and quality assurance for all data, data management, and data analysis.

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VI. The Future of Wilderness: Challenges of Planning, Management, Training, and Research

Jerry Stokes, National Program Leader for Wilderness Management, United States Department of Agriculture, Forest Service, addresses the Congress at one of the many fine plenary sessions (photo by Michael Olwyler).

USDA Forest Service representatives Tom Fitzgerald and Jeff Barney discuss leave-no-trace techniques with other delegates at the Congress poster session (photo by Michael Olwyler).

Wilderness Status and Associated Management Issues in New Zealand

Gordon R. Cessford
Murray C. Reedy

Abstract—The physical setting and management status of the wilderness resource in New Zealand are outlined. The main ecological, recreational, and indigenous cultural issues currently affecting wilderness are also discussed. This includes brief descriptions of the continuing pressure of introduced animal and plant pests on indigenous biodiversity, the recreational conflicts related to wilderness use by aircraft, and some of the implications arising from re-emerging indigenous cultural issues. These cultural issues are related to an increasing official acknowledgment of the customary links of the indigenous Maori with the protected natural areas of New Zealand.

Full understanding of the place of wilderness in New Zealand's protected natural area system cannot be achieved without considering its unique physical setting and historical context. The land area of New Zealand is similar in size to that of countries such as Italy, Norway, Vietnam, and Great Britain; the American State of Colorado; and the Indian state of Andhra Pradesh. Much of the land is rugged hill country or mountains, with the Southern Alps including 29 peaks over 3,000 m, and two active volcanoes dominating the extensive volcanic zones of the central North Island. New Zealand is also an island nation, with the North and South Islands having a combined coastline of 11,000 km. These islands are isolated in the temperate Southern Pacific Ocean. Apart from the tiny Polynesian Pacific islands, the land mass closest to New Zealand is Australia, 2,000 km away. The next closest land is 2,500 km distant—Antarctica.

This isolation occurred with the separation of New Zealand from the ancient southern continent of Gondwana some 80 million years ago, and resulted in divergent development of a unique assemblage of plants and animals. A feature of this biota was the lack of any mammal or marsupial life, some small bats excepted. The ecological niches such species filled elsewhere were occupied in New Zealand by birds, insects, and reptiles. In the absence of any competition or predation by mammals, some bird species became flightless, some insect species grew to large size, and plant species evolved with minimal pressure from browsing by animals.

It is estimated that the first Polynesian explorers arrived around 1,000 years ago, bringing with them the first human impacts on the New Zealand environment. The settlers who followed changed their new environment and were changed by it, and became the indigenous Maori of Aotearoa (New Zealand). The most vulnerable wildlife and plant species were either extinguished or depleted and confined to more isolated areas. As the ready sources of food and resources were depleted, Maori were increasingly required to adopt customary practices to allocate and regulate resource use (Davidson 1984; Ministry for the Environment 1997), and to shift toward more settled agricultural practices. These customs and practices contributed to a more stable relationship between Maori society and the environment prior to the next major change: the arrival of the first European explorers and settlers around 200 years ago. This signalled a new phase in New Zealand's development, including many revolutionary social and ecological changes that have significant bearing on conservation management in New Zealand today.

Social Changes

The single event of the most enduring social and political significance was the signing of the Treaty of Wading in 1840 between the rangatira (chiefs) of most Maori ICI (Tribes) and the British Government (Crown). This Treaty retains paramount importance throughout New Zealand society, and has major significance for current conservation management. In very simplified terms, the Treaty can be viewed as a partnership based on an exchange, with the three articles of the Treaty stating that:

1. Maori tribes cede all government authority to make laws to the British Crown; and in exchange:
2. The Crown promises to protect Maori customary rights to their lands, forests, fisheries and other valued assets; to guarantee Maori authority as vested in chieftainship; and also that the Crown (as opposed to individual settlers) has first right of land purchase if the tribe so wished, as protection against illegal land speculation; and
3. Maori have the rights, privileges and responsibilities of British citizens.

Today Maori represent some 13 percent of the 3.6 million people in New Zealand, and participate fully in its predominantly westernized society. Three main issues affect how the Treaty is operating 160 years later. The first is that the New Zealand Government now represents the Crown. The second is that there have been acknowledged failings in the Crown's protection of Maori interests as promised in Articles II and III of the Treaty. And the third issue is that there are some differences in translation between the English and Maori versions of the Treaty that are subject to ongoing debate about its meaning. These issues have contributed to a contemporary society in which social indicators clearly show that Maori have become relatively disadvantaged in health,

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wealth, and education. The 1975 Treaty of Wading Act established the Wading Tribunal, which continues to investigate Treaty grievances and make recommendations on how the Government might redress the consequences of these past wrongs. To address current issues and prevent future grievances, the Treaty duties of the Crown to Maori are now recognized to varying degrees in most environmental laws and policies, including those governing conservation management.

Ecological Changes

The change of most ecological significance was the introduction of a whole new array of human impacts. More effective means of changing the environment were available to both non-Maori and Maori, and many species of plants and animals were introduced. The consequent pressures from rapid habitat loss, new predators, competition, and grazing had a devastating impact on the indigenous ecology. For example, in less than 1,000 years, it is estimated that humans and their accompanying animals have removed 70 percent of forest cover and driven 32 percent of the indigenous terrestrial bird species to extinction. Moreover, around 1,000 species of indigenous plants and animals are threatened, including 37 of the 50 remaining endemic terrestrial bird species (Ministry for the Environment 1997). In this context much of the conservation management that takes place in New Zealand today could be considered a critical biodiversity rescue mission.

Despite the widespread ecological transformation of the country, the particular physical and social development of New Zealand have combined to allow retention of a very large potential wilderness resource (fig. 1). Population pressures are low. Estimates indicate that the average population density for New Zealand is around 13 people per square kilometer, compared with a world average of 44 (Ministry for the Environment 1997). Some 85 percent of people are urbanized coastal dwellers, concentrated in the upper half of the North Island. Very few live in remote areas, and unlike most other countries, nobody occupies the lands that are managed as protected natural areas. These lands comprise around 30 percent of New Zealand—among the highest proportions of protected natural areas of any country in the world. Also significant is that this extensive system of protected natural areas, including almost all the lands of remote wilderness, is managed by one integrated government agency, the Department of Conservation.

Conservation Management in New Zealand

The Department of Conservation is the sole government department responsible for managing protected natural areas. Established by the Conservation Act in 1987, it brings together all the functions of conservation management previously carried out separately by different government departments. Its mission is to provide:

- Conservation of New Zealand's natural and historic resources
- Appropriate use of these resources by the public
- Public awareness of, support for, and enhancement of a conservation ethic, both within New Zealand and internationally

To achieve this in the most integrated manner, the Department's management responsibilities include all national parks, forest parks, designated reserves, conservation areas, protected indigenous forests, protected inland waters, wild and scenic rivers, indigenous wildlife, recreational fresh-water fisheries, historic places on conservation land, marine reserves, marine mammals, and sub-antarctic islands. In all of these areas, the Conservation Act (1987) and other legislation also require that the work of the Department provides for the principles of the Treaty. This effectively means it must recognize Maori environmental values and practices, and the need to establish effective working relationships with Maori communities where required.

Wilderness Management in New Zealand

Subject to the primary aims of protecting natural historic resources, and giving effect to the Treaty, the Department is

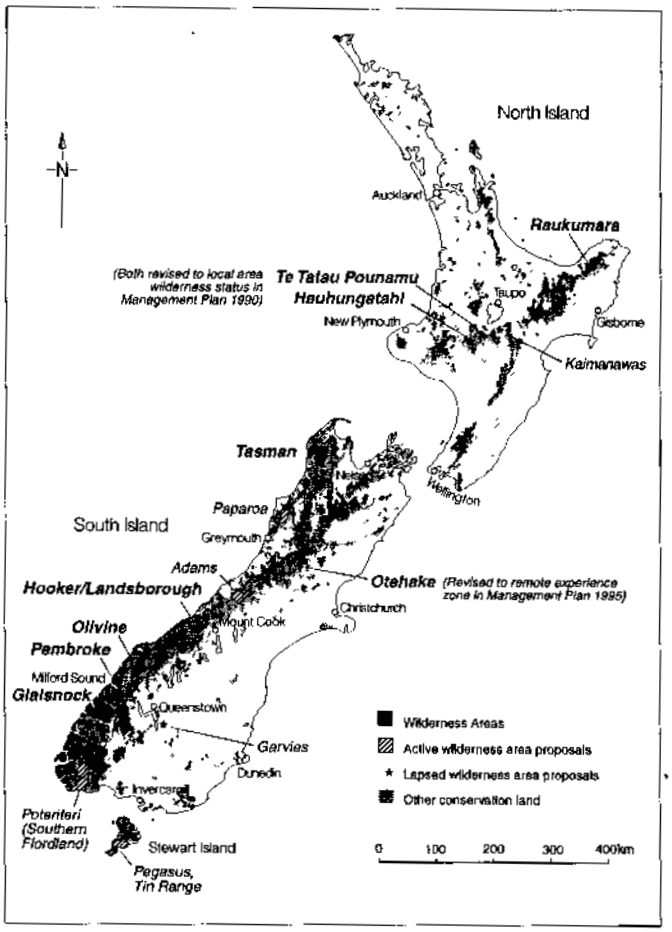

Figure 1—Protected natural areas and wilderness areas of New Zealand.

responsible for managing wilderness. It makes provision for wilderness and wilderness recreational experiences in three ways:

- Defining and legally gazetting specific "Wilderness Areas"
- Managing "Wilderness" in the Recreation Opportunity Spectrum
- Managing for a "Remoteness-Seeker" visitor group

Wilderness Areas

The term "wilderness" in New Zealand conservation management has a very specific meaning. It is related to the designation of certain portions of land as "Wilderness Areas." Legislative provisions for designated wilderness areas are included in the Reserves Act of 1977, the National Parks Act of 1980, and the Conservation Act of 1987. In each of these statutes, the purpose of these wilderness areas can be summarized as preservation of natural state, primarily for wilderness experience (Department of Conservation 1988). More specifically, the Conservation Act lists provisions that must apply to any wilderness area:

- Its indigenous natural resources shall be preserved.
- No building or machinery shall be erected on it.
- No building, machinery, or apparatus shall be constructed or maintained upon it.
- No livestock, vehicles, or aircraft shall be allowed to be taken onto or used on it.
- No roads, tracks, or trails shall be constructed on it.

The current operational specifications of what physical and social conditions are required to fulfill wilderness experiences in designated wilderness areas are provided in the Department's Visitor Strategy (Department of Conservation 1996), which guides management of recreation. Lands chosen for protection as wilderness areas should meet this criteria: They will be large enough to take at least two day's foot travel to traverse. They should have clearly defined topographic boundaries and be adequately buffered so as to be unaffected, except in minor ways by human influences. They will not have facilities such as huts, tracks, bridges, or signs, nor will mechanized access for recreation be allowed. These specifications are based on a widely adopted wilderness policy. This was derived originally from a conference convened by the Federated Mountain Clubs of New Zealand that included representatives of government departments, recreation groups, environmental groups, tourism interests, and industry interests (Molloy 1983). The Visitor Strategy goes on to list more specific guidelines about how these wilderness areas should be identified and managed:

- Allow no facilities or services. To retain natural wilderness qualities, developments such as huts, tracks, route markers, and bridges are inappropriate, and in the few cases where such facilities exist they should be removed or no longer maintained.
- Maintain adequate buffer zones. Adjoining areas should be managed as buffers to assist in the protection of a wilderness area; buffers may contain huts, tracks, and bridges, but these should be few, and vehicle access will be discouraged near the wilderness boundary.
- Limit access by remoteness. Wilderness is a fragile resource, susceptible to overuse; while wilderness areas are open to everyone, overuse will be minimized by selecting areas for their remoteness rather than by regulating access by permit.
- Control commercial recreation. To ensure the use of wilderness areas at levels compatible with the maintenance of wilderness values, commercial recreation activities may only be undertaken under license or permit.
- Prohibit motorized access or use. Because wilderness areas are places for quiet enjoyment, free from v"vious human impact, and require physical endeavour to achieve in full measure the wilderness experience, the use of powered vehicles, boats, or aircraft will not be permitted; horses may be allowed where strong historical links exist and where legislation permits.
- Require self-sufficient visits. Users of wilderness areas should be self-sufficient and depend on the natural environment for shelter and fuel only if the use of such resources does not detract from the values of the wilderness.
- Allow no other development or use. Logging, roading, hydroelectric development, and mining are also incompatible.
- Allow some management exceptions. Because of the over-riding importance of protection of intrinsic natural values and the safety of visitors to wilderness areas, restrictions on air access may be lifted temporarily for management purposes such as search and rescue operations, fire fighting, and control of introduced plants and animals.

On this basis, and taking into account past proposals for wilderness areas from the Wilderness Advisory Group (Cessford and Dingwall 1997; Molloy 1983, 1997), the Department currently manages six designated wilderness areas (fig. 1). The Department's renewed effort to establish more wilderness areas is evident from the commitments in its Strategic Business Plan (Department of Conservation 1998a) to designate four additional areas by the year 2002. However, the Department has also reclassified three previous wilderness areas that do not adequately meet the strict criteria for designated wilderness area status as being "remote-experience" zones.

All these wilderness areas barely exceed 2 percent of New Zealand's land area. But it must be re-emphasized that the Department applies very strict criteria to this designation. The criteria specified for wilderness areas (Category 1b) by the World Conservation Union (IUCN 1994) are similar to those for New Zealand wilderness areas, but make more allowance for minor human modification and habitation. The reality is that in most parts of the world people are living in the protected natural areas. In this context, a very high proportion of New Zealand's conservation lands outside of the designated wilderness areas would be considered the most remote kind of wilderness. Even in the more similar land use and habitation conditions of the United States, the management specifications for their wildernesses, if applied to New Zealand, would include an expanse of lands far beyond what are currently managed as designated wilderness areas. This reflects the rugged nature of most New Zealand conservation lands—sparse road access and facility development, and low visitor numbers.

The Wilderness Opportunity Class

If we consider the categories from the New Zealand Recreation Opportunity Spectrum (Taylor 1993), United State's wilderness areas would include lands outside of the Wilderness opportunity class (fig. 2). To illustrate this point, the "remote" and "back-country walk-in" opportunity classes in New Zealand are generally characterized by a high probability of experiencing isolation from the sights and sounds of humans, closeness with nature, and only a few encounters with other groups. Outdoor skills, challenges, and risks (fig. 3) are important, although subject to weather and river conditions, some reliance can be placed on different levels of track, bridge, sign, and hut provision (fig. 4). There is likely to be only light regulation or other management presence. These conditions would match those in most U.S. wildernesses, yet in New Zealand they exist in most of the extensive protected natural areas not managed as wilderness areas.

The Remoteness-Seeker Visitor Group

The Visitor Strategy extends the Recreation Opportunity Spectrum approach to identify a functional range of visitor groups, distinguished by the manner of their activity. This includes reference to the setting the group uses, the accessibility of the areas, the nature of the visit, the activities undertaken, the experience sought, the degree of risk present, the facility and services sought, and the visitor group characteristics. The only visitor group directly provided for in the designated wilderness areas are the Remoteness-Seekers. They are seeking the types of experiences that could only be provided in wilderness areas or the more remote areas that meet most wilderness conditions (fig. 5) (Cessford and Dingwall 1997).

Backcountry Adventurers

Another group, the Backcountry Adventurers, are also active in some of these remote areas, but are generally more often associated with the more accessible "backcountry walk-in" zones. These two visitor groups comprise only a small minority of all visitors to protected natural areas. Most visitors make shorter overnight trips and day visits to more developed and accessible "frontcountry" sites (Cessford and Dingwall 1997).

Overall, the principles underlying these three types of wilderness provisions illustrate the point made in the Visitor Strategy that New Zealand wilderness is primarily a recreational and cultural concept. However, despite this recreational basis for assigning wilderness values, the actual specification of wilderness conditions has been driven by preservation-oriented attitudes to conservation that separate the values of the natural world from the presence of people. Past consideration of wilderness values in New Zealand has generally been exclusive of other human interests or cultural values. For example, in the 1981 Wilderness Conference (Molloy 1983), Maori cultural values for nature and for outdoor recreation were barely mentioned. Any similar conference held today would most likely include much wider cultural parameters. Recent developments in acknowledging Maori customary rights are now raising new issues with implications for wilderness designation and management.

Current Issues For Wilderness Management

Today there are few threats to the integrity of New Zealand's wilderness areas. This is due to their extreme remoteness, the sustained difficulty of access, the low demand pressures, the regulations that are in place, and the focus of management on providing more services for frontcountry visitors to protected natural areas (Barr 1997; Cessford and Dingwall 1997). The only major issues that may affect how some wilderness areas are valued in the future relate to general ecological sustainability, the intrusive potential of aircraft overflights (Cessford and Dingwall 1997), and more recently, the implications of renewed customary rights for Maori.

Ecological Sustainability

While New Zealand wilderness originated largely as a recreation-experience concept, an important value component relates to the ecological integrity of the environment. Human effects on protected natural areas, and on wilderness in particular, are now well regulated. However, continued depletion of indigenous species (fig. 6) and habitat by introduced animals and plants remains the greatest overriding threat to conservation values. While wilderness is managed to be remote from people and their effects, it is not remote from this ecological pressure. In this respect, wilderness is not distinguished from any of the other protected natural areas. If ecological priorities require it, the Department itself will allow the use of aircraft, machinery, and structures in wilderness. The main concession to wilderness status is that these necessary intrusions must be temporary (Department of Conservation 1996).

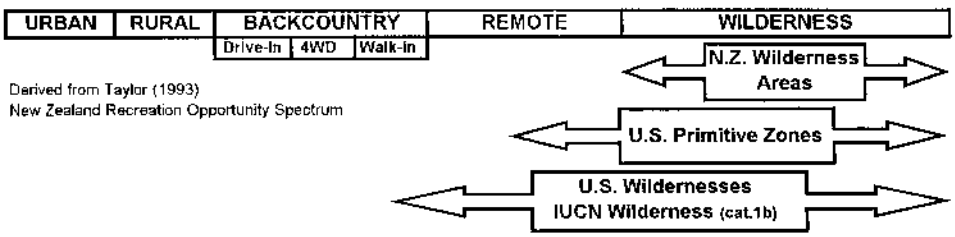

Figure 2—Comparison of New Zealand and United States Wilderness Designations.

Figure 3—Wilderness users require high levels of fitness, skills, and self-sufficiency for the challenging natural settings they face (photo by Gordon Cessford).

Figure 5—Only minimal facilities aid recreation use of the extensive " remote-experience" areas outside of the designated wilderness areas (photo by Gordon Cessford).

Figure 4—No huts, campsites, or trails are provided to assist wilderness users in New Zealand (photo by Department of Conservation).

Figure 6—People of Ngati Kuia assist in translocation of a rare bird from their tribal area (photo by Don Merton).

Recreation Intrusion

The only recreation intrusions that may significantly affect wilderness experiences under current conditions are overflights by sightseeing aircraft. Controls on aircraft use are limited only to a ban on landings and a minimum overhead altitude of 500 meters. By international standards, the noise and intrusion impacts of aircraft on wilderness experiences are not widespread in most of the remote natural areas of New Zealand. However, extreme examples do occur in popular remote locations outside wilderness areas, such as the 69 percent of Milford Track visitors who reported being bothered by hearing aircraft (Cessford 1998). While the Milford Track remains an outstanding wilderness experience for many people, the aircraft activity levels appear to exceed what most visitors expect. In the more remote wilderness areas, expectations would be for few or no encounters at all, and conflicts can arise at very low levels of

aircraft activity. Since wilderness managers continue to have only limited influence on the flight paths and behavior of low-flying aircraft, this problem remains difficult to address. However, apart from these aircraft effects, and given current management practices and recreation trends, no other major types of recreation intrusion are anticipated (Barr 1997; Cessford and Dingwall 1997).

Maori Cultural Values

Other forms of potential socio-cultural intrusion or conflict are the issues relating to traditional Maori values for natural areas and the customary use of resources, and how these might differ from those of current wilderness recreationists. This issue is important to address, because many of these customary values are being renewed as part of Treaty settlements. Moreover, under the Treaty provisions outlined in the Conservation Act, the Department must now more proactively consider these values and work directly with Maori.

Many New Zealanders, both Maori and non-Maori, have a powerful sense of belonging in New Zealand natural landscapes. But many traditional natural values that are held by Maori are very different from those derived from the western European culture (James 1993). The predominant attitudes of early European settlers strongly emphasized the benefits to be derived from the development and use of land. However, like the original Polynesian settlers, the later European settlers were also changed by their new environment. In more recent times, the existence of protected public natural areas and the rights of access to them have been associated with unique values of freedom, equality, and heritage by many New Zealanders (Department of Conservation 1996). Along with preservation-oriented concerns about environmental degradation, these types of values have been important driving forces in the development of the New Zealand protected natural area system in general, and wilderness areas in particular (Department of Conservation 1996; Molloy 1983).

For Maori holding traditional values, close relationships with the natural world are part of the interconnected spiritual and ancestral bonds linking people, place, history, and identity (New Zealand Conservation Authority 1997). Maori have different spiritual associations with the areas they live in or identify with. It was to protect such relationships from development pressures that paramount chief Te Heuheu Tukino in 1887 gifted the most sacred mountains of his Ngati Tuwharetoa Tribe to the government for a park. When the Tongariro National Park was established from these lands in 1894, it was the fourth National Park in the world, and the first gifted from an indigenous people (Department of Conservation 1994). Recognition of these relationships and the significance of this gift led to Tongariro National Park, in 1993, being the first cultural landscape inscribed on the World Heritage List. It was considered an outstanding example of an "associative cultural landscape," defined as being landscape "justifiable by virtue of the powerful religious, artistic or cultural associations of the natural element rather than the material cultural evidence, which may be insignificant or even absent" (World Heritage Committee 1994).

However, these values were not just expressed in a spiritual sense. The traditional Maori view of the natural world correlates closely with those of other indigenous cultures that exhibit a philosophy of sustainable use of natural resources, including mechanisms for protection (Department of Conservation 1997). Maori from different tribal, collective, and family groups have traditionally had different customs for protecting historically significant sites, particularly ancestral burial grounds, and important food resources such as some bird species, fish stocks, and shellfish gathering areas. These values, customs, and practices were sustained by making some sites and resources sacred and off limits (tapu) for different periods of time. Some species and resources were also subject to temporary or seasonal harvesting bans (rahui), or complex customary harvesting and use protocols (Tikanga Maori) (Ministry for the Environment 1997).

From a contemporary Maori perspective, these cultural values and associations remain applicable to any public and private lands, irrespective of their current management classification. In lands managed specifically for particular conservation or recreation purposes, such as wilderness, any renewal of these values and their associated practices may conflict at times with the largely preservation-oriented principles that have traditionally dominated conservation debates and management in New Zealand.

However, it is important to note that most of the current cultural issues do not relate directly to wilderness areas. Few past Maori lived in the areas currently managed as wilderness. The present national preference for living in the north of the North Island was also reflected in past Maori population distributions. Like most other New Zealanders, over 80 percent of Maori are now urbanized (Ministry for the Environment 1997) and share most aspects of the same international westernized culture. However, many Maori have retained or recently renewed their involvement in traditional tribal structures or their urban equivalents, which on the basis of Treaty provisions are now getting more involved in conservation management processes and issues. While most of these processes and issues relate to those parts of New Zealand where population and human customary use has traditionally been concentrated, some of these processes and issues will have increasing application to wilderness management.

Managing for Maori Cultural Values in Protected Natural Areas

In general, the Department of Conservation has made considerable provision for working in cooperation with Maori, particularly in the protected natural area system outside the remote wilderness areas. Special liaison managers act at a senior level in each of the Department's 13 Conservancy Areas, and an overall management strategy has been developed to outline the basis and principles for the extensive interaction required with different Maori groups (Department of Conservation 1997). In terms of the Department's relationship with Maori, basic legislative conditions require that provisions be made for formal consultation and communication processes.

The Department also facilitates increasing inclusion of Maori groups at the more inclusive levels of advisory committees, management boards, and some cooperative management arrangements. Initially, this is achieved through development of inclusive planning processes at the strategic site-based and issue-specific levels. Then, involvement is further enhanced and diversified through the different cooperative management practices and programs being increasingly applied through these planning processes. In this context, and to take account of the Department's obligations to Maori under the Treaty, the main types of management provisions that appear to be required for wilderness management in particular can be generalized as those that:

- Respect the formally acknowledged cultural values and associations held by Maori for different places
- Make allowance for any formally acknowledged customary practice and uses related to these values and associations

Respecting the Cultural Values and Associations of Places

It has become evident that the fundamental basis of any working relationship between the Department and Maori is an official recognition of the status of different traditional Maori groups. These can include groups such as iwi (tribes), hapu (regional iwi collectives), whanau (local and family collectives), and more contemporary representative collectives such as urban Maori authorities and statutory trust boards. In each of these, official recognition is based most on acknowledging the group's status as the tangata whenua (people of the land) in particular areas and places, and kaitiaki (guardians) of the resources and values associated with them. Such recognition creates the framework for developing cooperative consultation and management when engaged in normal planning processes, or when addressing specific issues. In many places, this recognition has been well established for many years, and has resulted in long-term management associations between conservation managers and Maori. For example, the Department works closely through formal processes with the Ngati Tuwharetoa Tribe in management of Tongariro National Park and surrounding conservation lands.

However, in places where losses of traditional customary rights and associations are being addressed through negotiation of comprehensive settlements of Treaty claims and historical grievances with tribes, these values must be specifically identified, acknowledged, and re-established. A recent example is provided by settlement of the Treaty claim made by the Ngai Tahu Tribe. Its tribal area covers most of the South Island of New Zealand, and includes most of the national conservation lands (65 percent) and five of the six current wilderness areas. In this settlement, several new legal instruments were developed that created a new framework of legal recognition for Ngai Tahu values, objectives, and roles in the conservation management of specific areas and sites. The objective of these instruments is to provide Ngai Tahu with an opportunity for greater input into the Department's policy, planning, and decisionmaking processes, consistent with the principles of the Treaty of Waitangi.

One example of a new provision with wilderness implications is the new statutory classification attached to several prominent mountains and other areas of importance to Ngai Tahu. People are still free to climb these mountains and visit these areas, including New Zealand's highest peak, Aoraki/Mount Cook. But the Department will proactively inform visitors of the status and cultural values of Ngai Tahu in these places, and they will be encouraged to adopt behaviors that respect these values. Climbers, for example, will be provided with information that explains that standing on certain mountain summits denigrates their sacred status. Compliance is left as a matter of personal conscience and sensitivity, but does not necessarily represent a negative intrusion on the wilderness experience. Rather, this type of request is based on the substantial cultural value of these areas to Maori, which in effect enhance the other values already attributed to these special places by wilderness recreationists and advocates. However, where the Department's recognition of these values is also accompanied by provision for some customary use, perceptions of cultural intrusion or conflict may arise.

Making Allowance for Customary Uses

One of the key benefits from having customary uses and practices specifically acknowledged and included in management processes is that an opportunity is provided to actively restore a right or protect a value. Subject to the need to protect species and ecosystems, the Department already meets a wide range of these needs. There is a wide range of legal provisions, policies, and protocols in place for the customary use of resources, including whalebone, feathers, plants, timber, fresh-water fish, eels, seabirds, shellfish, and fish (Department of Conservation 1997). One example is a recent protocol for the management of whale strandings (Department of Conservation 1998b). In this document the relationship between the Ngatiwai Tribe, the Department, and the resource is specifically defined and acknowledged. In addition, specific procedures for incident reporting, collection of samples, collection of scientific data, and recovery of cultural materials (such as whalebone) are specified.

Customary use issues can also relate to specific access and activity provisions on conservation lands. For example, as part of the Ngai Tahu treaty settlement, provision is made for Nohoanga entitlements, which give some rights of access to rivers and lakes, temporary camping, and fishing. In another example, the Visitor Strategy conditions for wilderness allow for possible use of horses where strong historical links exist and legislation permits. As well as fulfilling Treaty obligations, these provisions also acknowledge that New Zealand is a signatory to the Convention on Biological Diversity, which recognizes the rights of access to traditional materials on a sustainable basis by indigenous peoples (Department of Conservation 1997).

There are some conflicts over current and proposed provisions for customary uses of indigenous plants, animals, and traditional materials, and related access conditions. In part, these reflect some differences between Maori and non-Maori perspectives on traditional cultural rights in natural areas. When reviewing public submissions on customary use issues, the New Zealand Conservation Authority acknowledged this type of difference. But it also noted considerable

common ground in attitudes toward conservation of species and habitats, illegal poaching and unsustainable harvesting, and interest in conservation involvement (New Zealand Conservation Authority 1997).

Conclusions

Given the relative security of wilderness areas and remote experience opportunities under current management conditions, and the proposals to establish additional wilderness areas in the next few years, particular issues specific to wilderness are not a major concern in New Zealand at this time. Any management concerns about sustaining the ecological, recreational, and cultural values of wilderness are transcended by the impact issues throughout the wider protected natural area system. The Department's integrated management of the protected natural areas provides the best protection for these wilderness values. The main contribution the New Zealand experience can make to conservation management in other nations will come from examples derived from its integrated management approach across diverse protected natural areas, rather than solely from its management of wilderness areas. The main contribution that the conservation management of other nations can make to New Zealand will be from their greater experience in dealing with protected natural areas that are inhabited by people.

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Meeting Multi-Agency Wilderness Training and Education Needs with Limited Fiscal and Human Resources

Gregory Kroll

Abstract—The Wilderness Act of 1964 created a National Wilderness Preservation System that currently comprises 104 million acres of Congressionally designated wilderness, managed by four Federal agencies: the USDA Forest Service, the USDI National Park Service, the Bureau of Land Management, and the U.S. Fish and Wildlife Service. Demand for training for wilderness managers, as well as the need for interagency management consistency, resulted in the creation of the Arthur Carhart National Wilderness Training Center in 1993. This paper addresses the Carhart Center's administrative structure, oversight and funding, its needs assessment process, courses offered, instructional philosophies, and public education efforts. The applicability of this model to other countries is discussed.

The Wilderness Act of 1964 created a National Wilderness Preservation System that currently comprises 104 million acres of Congressionally designated wilderness. These areas are managed by four federal agencies: U.S. Forest Service (USFS), National Park Service (NPS), Bureau of Land Management (BLM), and U.S. Fish and Wildlife Service (USFWS). Although one would expect consistent National Wilderness Preservation System management across agency boundaries, there has existed little overarching coordination and few professional training opportunities. To address this need, and at the urging of Congress, the Arthur Carhart National Wilderness Training Center (Carhart Center) was established at the Forest Service's Nine Mile Ranger Station, Huson, MT, with the purpose of training wilderness managers and educating the public about wilderness.

The Carhart Center was named for one of this country's earliest wilderness advocates, a Forest Service landscape architect who, in 1919, successfully argued for the preservation of a scenic lake and its primeval environs as an alternative to planned recreational development.

By intention, the Carhart Center is not a destination training facility; rather, staff identifies training needs, designs curricula, and presents wilderness training to interagency audiences throughout the United States. The Center strives to take a balanced approach to wilderness management controversies and does not set national wilderness policy.

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Mission

The mission of the Carhart Center is "to foster interagency excellence in wilderness stewardship by cultivating knowledgeable, skilled and capable wilderness managers and by improving public understanding of wilderness philosophy, values and processes."

The Carhart Center's vision is to be a "national and international leader in the development and implementation of wilderness information, training and education programs."

Administrative Structure

The Carhart Center was created in 1993 through an interagency agreement signed by the directors of each of the four wilderness-managing agencies (USFS, NPS, BLM, and USFWS). Oversight is provided by a Steering Committee comprising one member from each of the four agencies. The Steering Committee sets overall direction and selects annual priorities.

The Carhart Center staff consists of a director (who may be employed by any of the four agencies), one representative from each agency, and administrative or support staff. Each agency is responsible for the salary of its representative, and for one-quarter of the director's salary, support staff salary, and overhead.

Needs Assessment Survey

In order to most effectively use the Carhart Center's limited staff and funding, a survey was conducted in the winter of 1995-1996 to identify wilderness management issues and training and educational outreach needs. Surveys were sent to the 893 offices of the four agencies that manage the National Wilderness Preservation System. Two surveys were mailed to each office: one to the manager and one to the staff person most responsible for wilderness management. Sixty-four percent of the offices responded; 49 percent of the surveys were completed and returned.

Respondents were asked to identify their top three wilderness issues. The responses were first categorized into broad, general issues, and then into specific issues. "Recreation management" was the most important general issue for all agencies except the BLM. Additionally, "administration," "special provisions," and "illegal activities" ranked in the top five for all agencies.

"Overuse" and "prescribed natural fire" were the specific issues common to all agencies except the BLM. "Off-highway vehicle use" was the most important issue for the BLM and was common to every agency except the NPS.

Course Development

Annual course offerings are driven by the needs identified through a needs assessment survey. Course location priorities and timing are likewise based on the survey results. This responsiveness to the field ensures that the most is made of limited staff and funding.

Once the need for a course is identified, a Carhart Center staff member is selected to take the lead on following the course through, from initial planning to the final evaluation stage. In turn, course leaders appoint a course-development Steering Committee, comprised of at least one field member from each of the four agencies (and sometimes more), depending on needed expertise and workload. The interagency course Steering Committee is responsible for addressing all logistics associated with course development including location, agenda, speakers, transportation, meals, housing, and post-course evaluation. It has been found that small Steering Committees are more effective than large committees.

Presenters are chosen based on subject matter expertise, familiarity with regional and local issues and delivery skills, and can include Carhart Center staff or course Steering Committee members. It is requested that presenters submit an outline of their presentations in advance to avoid misunderstandings over intended content. Travel costs for presenters are underwritten and honoraria may be provided.

Written evaluations of each presenter and of the overall training session are completed by each course participant. These evaluations are carefully reviewed by the course Steering Committee, and future sessions are revised in direct response to recommendations made by course participants. This ensures that content is relevant to managers and that a high caliber is maintained.

These broad course development guidelines have evolved over time:

- Establish an interagency Steering Committee for each course.
- Establish clear course objectives based on needs identified by the field.
- Host courses at locations most convenient to the majority of the targeted audience.
- Use presenters having subject matter expertise, familiarity with issues, and professional delivery skills.
- Use case studies of actual wilderness management issues.
- Put course participants in direct contact with the wilderness resource when possible.
- Balance course attendees among agencies and include non-Federal participants.
- Revise future courses based on participant evaluations.

These courses have been offered by the Carhart Center, or are in the developmental stage:

- National and Regional Wilderness Stewardship
- Wilderness Visitor Use Management
- Wilderness Planning
- Wilderness Awareness
- Wilderness Lands Restoration
- National Park and Wilderness Fire Management
- Wilderness Interpretation and Education
- Wilderness and Land Ethics Curriculum/Leave No Trace
- Correspondence Courses (with the University of Montana)
- Agency-Specific Workshops (held at individual wilderness units)

Public Education

Hand-in-hand with the Carhart Center's mission of training wilderness managers is the goal of improving public understanding of wilderness philosophy, values, and processes. This has been approached through development of classroom curricula and other outreach products.

The Carhart Center has developed and distributed two different, comprehensive Wilderness and Land Ethic curricula—one targeting kindergarten through eighth grade students, and one designed for ninth through twelfth grade students. The curricula integrate wilderness concepts and values into an array of subject-matter topics, making it attractive and convenient for teachers to include wilderness in their lesson plans. The Carhart Center also offers courses that provide wilderness managers with the skills needed to present teachers' workshops locally to facilitate use of the curricula.

In concert with the Aldo Leopold Wilderness Research Institute and the University of Montana, the Carhart Center sponsors the Wilderness Information Network, the quintessential source of accurate and current wilderness information, available on the World Wide Web at www.wilderness.net. The Wilderness Information Network will eventually provide basic information on all wilderness units in the United States, texts of national wilderness legislation and policies, retrievable copies of Carhart Center and Leopold Institute publications, and wilderness news.

As demand is identified and resources become available, the Carhart Center strives to meet unfulfilled information needs. The Center is partnering in the development of an up-to-date map of all wilderness areas in the United States. It has compiled collections of state-of-the-art information, such as the "Fire Resource Tool Kit;" and it has produced publications, such as its "Wilderness Quote Book."

Applicability of the Carhart Model to Other Countries

The organization and role of the Arthur Carhart National Wilderness Training Center may have applicability to other countries. The Carhart model provides a number of benefits:

1. Highly efficient use of limited human and fiscal resources through the pooling of several agencies' personnel, funding, and efforts.
2. Increased level of participation because training is offered where demand is the highest.
3. Courses that are immediately relevant to field needs.
4. Continuous course improvement based on participant feedback.
5. Increased management efficiency that interagency networking provides.
6. Renewed enthusiasm and dedication to wilderness stewardship that trainees take back to their administrative sites after participating in training.

In a world where wilderness managers face increasingly complex and intractable pressures on the wildlands under their purview, the Arthur Carhart National Wilderness Training Center model may serve as a valuable component of an overall wildlands preservation strategy.

Wilderness Management Training in Southern Africa: Ensuring Appropriate Management and Use of Existing Wilderness Areas

W. D. Densham
T. G. Cooper

Abstract—Wilderness management training in southern Africa has been offered by the Wilderness Action Group of Southern Africa in the form of two courses, basic and advanced, since the early 1990's. With a balance between lectures and practical work, the courses are both relevant and interactive between participants and facilitators. Since their inception, the courses have resulted in a number of important outcomes for wilderness conservation in both Namibia and South Africa. These include formation of two new wilderness-oriented associations, preparation of management plans for a number of wilderness areas, enhanced appreciation of the value of wilderness in the region, and the nomination of candidate areas for wilderness designation. Enjoying significant support from international and local organizations, the courses are held on an annual basis.

Wilderness conservation in both South Africa and Namibia gained prominence because of the efforts of concerned individuals and non-government organizations recognizing the important role wilderness areas can play in people's lives. This trend began in South Africa in the mid-1950's. However, Namibia, where wilderness conservation is a more recent development, did not follow suit until 1984. The need for structured training, due to the relatively small size of southern African wilderness areas and their fragile habitats, was only recognized recently. If these areas are not used or managed with sensitivity (due to a lack of management expertise), their unique wilderness character and resources will be impaired or permanently lost.

The Wilderness Management Training Courses were developed as a result of needs identified at the First South African Wilderness Symposium held in September 1989, in Durban, KwaZulu-Natal. The first courses were conducted in the Umfolozi Game Reserve in October 1991, under the auspices of the Wilderness Action Group. Following the Wilderness Management Symposium held in the Waterberg Plateau Park in June 1996, the Action Group was invited to hold its courses in Namibia.

Wilderness Management Training Courses

The courses provide training to equip wilderness managers with the skills needed to preserve wilderness areas and their unique characteristics. Courses are designed similar to those used by the U.S. Department of Ariculture's Forest Service, but are adapted for southern African circumstances. This is due to the fact that Paul Weingart of the WILD Foundation (International Wilderness Leadership Foundation) offered to develop these courses for South Africa. He had a good sense of what was required, having spent some time visiting southern African countries since the 1970's (Weingart 1998). The concepts of wilderness, the need for wilderness areas, and wilderness management principles form the core of the basic course. The advanced course introduces participants to planning processes and setting limits of acceptable change for monitoring purposes. In both courses, the "minimum tool" principle and the fact that wilderness areas cannot be viewed in isolation are repeatedly stressed.

Courses are limited to 25 participants to optimize opportunities for interaction and discussion of case histories. These discussions are interesting and informative, and have proved to be valuable in the interchange of experiences. At the beginning of each course, participants are asked to state their expectations. Upon completion of the course, they are asked to reflect on how these expectations have been fulfilled.

Courses are held over a 5-day period and include a field visit. Course contents are given in a series of short presentations, and videos of wilderness areas and wilderness-related issues are shown to the basic course participants because many of them have no idea of these aspects. An important component of each course is a planning exercise based on an actual management problem. Participants are divided into small work groups (ideally four to six people per group) and are required to solve the management problem through the application of the management principles they have learned. Each work group then presents its findings to the entire group, giving their considered management action, the management principles they applied, and reasons for their decisions.

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Manuals are given to each participant so that they have a workbook to refer to in their respective work situations. This has been made possible with the assistance of the WILD Foundation. Each course participant is also issued the Wilderness Action Group's course-completion certificate.

The training courses have a number of strengths that have ensured their ongoing success. They are held in the field with small numbers of participants; they encourage high interaction between the participants and facilitators; and practical case studies add value and dimension to the enjoyment of the participants.

Basic Course

The basic course covers the elementary aspects of wilderness management and control of visitors in the wilderness to preserve wilderness character and its resources. The course training objectives are:

1. To understand the concept of wilderness as a protected area category.
2. To be able to define wilderness and the need for this form of protected area, and the legislative protection currently provided in South Africa or Namibia.
3. To understand the principles of wilderness management and the need to develop special management skills.
4. To understand the basic principles relating to visitor management in wilderness.
5. To be able to develop a wilderness education program.

The course objectives defined the course contents and program:

Day 1—History and Philosophy of Wilderness
- Registration
- Course overview, format, and objectives
- Introductions and course expectations
- Introduction of how formal nature conservation agencies, conservancies, and wilderness areas are integrated
- Why and what of wilderness, and the history of wilderness
- Discussions

Day 2—Managing the Wilderness Resource
- The need for statutory protection of wilderness areas
- Principles of wilderness management
- Wilderness management case studies
- Videos on aspects of wilderness

Day 3—Visitor Management in Wilderness
- Uses of wilderness areas
- Wilderness use case studies
- Principles of visitor management
- Visitor management case studies
- Field visit to reserve led by Reserve Manager
- Videos on aspects of wilderness

Day 4—Further Aspects of Wilderness Management
- Visitor management case studies
- Visitor control measures
- Wilderness education
- Further aspects of wilderness management
  - Fire management and control
  - Wilderness wildlife management
  - Law enforcement
  - Aircraft over wilderness areas
  - Cabins and structures
  - Competitive events

Day 5—Review of Course
- Review of participants' expectations
- Course evaluation
- Closing comments

Advanced Course

The advanced course is open to those who have completed the basic course to ensure all participants have the same basic understanding of wilderness concepts. It assumes that all participants understand the principles of wilderness management so that meaningful discussions will revolve around the process of developing management plans and programs for wilderness areas. Course participants are required to bring a 1:50,000 map of a wilderness area for the planning exercise, and are also asked to give a short presentation about the wilderness area in which they work. The advanced course objectives are listed below.

At the end of the course, participants will be able to:

1. Appreciate the contributions to society of wilderness as a protected area category and its role in relation to other protected area categories in conserving wilderness resources, natural environments, biodiversity conservation, and wilderness experience.
2. Gain hands-on experience in practicing wilderness management principles by participating in a "Wilderness Manager-for-a-day" exercise.
3. Develop an understanding of the application of the Recreation Opportunity Spectrum, the Wilderness Opportunity Spectrum, and the principles of the Limits of Acceptable Change.
4. Prepare a basic management plan for a wilderness area to gain practical experience in wilderness planning.

The course objectives defined the course contents and program:

Day 1—Importance of Wilderness Areas as a Resource in Review
- Registration
- Course overview, format, and objectives
- Introductions and course expectations
- Role of wilderness areas as protected area category
- Management of wilderness resource and management principles

Day 2—Wilderness and You
- Course participants' presentations on a wilderness area
- Discussions on presentations
- Wilderness Manager-for-a-day exercise (by groups)
- Group report-back and discussion session

Day 3—Principles of Wilderness Planning
- Integrated environment management process and its relation to wilderness areas
- Recreation Opportunity Spectrum
- Wilderness Opportunity Spectrum
- Limits of Acceptable Change
- Practical planning exercise (by groups)
- Field visit into reserve led by Reserve Manager

Day 4—Wilderness Planning Exercise

Practical planning exercise
Group presentations of planning exercise
General discussions

Day 5—Course Evaluation

Review of course expectations
Course evaluation
Closing comments

This course equips participants, who have little or no experience in planning, to grasp the elementary principles and to produce the beginnings of a management plan for their areas. They are encouraged to complete and then incorporate these plans in their wilderness areas. The courses have been successful in stimulating field staff members to produce management plans for two wilderness areas in South Africa that have now received official recognition. Management plans are currently being prepared for a number of wilderness areas within the Namibia Parks.

Evaluation of Courses

The courses are evaluated at three stages. The participants are requested to complete a post-course questionnaire and to give suggestions for improvements. These forms are anonymous, giving them more freedom to make their comments and ensuring that the facilitators receive comments from each of the participants. The participants are asked to rate the content of the course, the value of the course, and the facilitators. The completed forms are scrutinized carefully by the facilitators to note all the comments so that the courses are kept relevant for the needs prevailing at the time. Results are summarized in a report by the facilitators that is submitted to the Directors of the Wilderness Action Group. Then, at the closing stage of the course, participants are given an opportunity to make suggestions for any course changes. The comments, evaluations, and suggestions (captured by the facilitators for the overall assessment of the courses) have led to a number of course improvements and have proven extremely valuable in keeping the courses relevant and successful.

At a session conducted after all courses have been completed for the year, facilitators review participant comments and make their own points on how the courses could be improved. Once agreement is reached concerning what adjustments are needed, preparations are made for the following year's courses.

The fundamental structure of the courses has not changed substantially since initiation of the first basic and advanced courses. The methods of presentation, the use of visual aids, the timing of the program, the manuals, and the addition of new topics have formed the basis of the improvements.

Course Outcomes

Over the period that the courses have been offered, 350 participants have attended. They have come mainly from the formal nature conservation agencies, although people from the local communities, private land owners, and non-government organizations have recently taken part. The courses have resulted in:

- A wider appreciation of the value of wilderness as a protected area category and its role in the conservation of sensitive and fragile environments.
- The promotion of the wilderness concept in providing specialist tourism opportunities, spiritual rejuvenation, and the preservation of cultural heritages.
- The support of participants for the need for specialist management skills to preserve the wilderness characteristics.
- The promotion of the tenets of wilderness management, with special reference to the "minimum tool" concept.
- An appreciation of the specialist planning procedures of the Recreation Opportunity Spectrum, the Wilderness Opportunity Spectrum, and the Limits of Acceptable Change for appropriate wilderness management.
- Recognition of the need to monitor the effects of visitor use.

Since the start of the courses, two wilderness area management plans have been prepared, approved, and implemented in South Africa. They are for the Umfolozi Wilderness Area in KwaZulu-Natal and the Baviaanskloof Wilderness Complex in the Eastern Cape. There is now more public involvement included in the management of each of these areas. For example, the Friends of the Baviaanskloof Wilderness Area assist the staff in a number of significant ways, and the Umfolozi Wilderness Area has a representative of the Wilderness Leadership School on its management steering committee. This committee discusses all aspects of wilderness management and decides what the best management direction is for the area.

Wilderness Action Group Courses are becoming recognized by the formal nature conservation agencies. The Namibian Ministry of Environment and Tourism has included them as a component of its official training schedule. The KwaZulu-Natal Nature Conservation Service has also indicated willingness to accord them formal recognition. This formal recognition will enable participants to include successful course participation in their 'curricula vitae' (course requirements) for promotion purposes.

In October 1997, past participants, through their enthusiasm and concern for wilderness formed the Wilderness Management Association, which is affiliated with the Wilderness Action Group. And in July 1998, the Namibian Wilderness Association was formed as a result of the courses.

Way Forward

The Wilderness Management Courses have played an important role in wilderness conservation in the southern African region. This has been in spite of the fact that funds to run them has been a severe constraint. There are a number of non-government organizations that have assisted in ensuring that the courses continue to be available. They are: the WILD Foundation, Wilderness Leadership School, Wilderness Foundation, Wildlands Trust, Msinsi Holdings, Namibia Nature Foundation, Rossing Uranium Mine, U.S. AID, and the Royal Netherlands Embassy. A number of formal nature conservation agencies have played a significant role as well, including the former Natal Parks Board, the former Department of Nature Conservation, Eastern Cape Nature Conservation, and the Namibian Ministry of Environment and Tourism.

The Wilderness Action Group has also received support from the U.S. Forest Service; an agency member traveled to southern Africa to assist in the facilitation of the Wilderness Action Group Courses. The Group is indebted to the Forest Service and plans to strengthen this cooperative tie in order to further ensure the success of its Wilderness Training Courses.

The reduction of government funding to formal nature conservation agencies is a reality that has become more serious in the last 3 years. As this scenario is likely to continue, the Wilderness Action Group is in the process of seeking funding to be able to offer its courses on a more structured basis.

There are a number of candidate wilderness areas throughout the region that have unique characteristics. These wilderness training courses can assist in the wilderness designation of these areas by making people more aware of the value of wilderness to present and future generations. One way this can be achieved is by offering the courses to people who live in communities on the boundaries of wilderness and protected areas. The Wilderness Action Group is committed to continuing to offer its courses to keep widening that awareness of the value of wilderness to society.

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The Internet in Wilderness Distance Education: A Case Study

Stephen Peel
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Abstract—Education is recognized as one of the most effective tools in managing wilderness. Nevertheless, there are few wilderness management courses taught and no degree programs offered at the university level. This creates a fundamental problem for wilderness educators: how to deliver current, relevant knowledge to the public in an academic environment. To explore the practicality of offering university level wilderness management courses via distance education, the University of Montana offered one distance education course, "Managing Recreation Resources" (RECM 495D), over the Internet. Twenty-three undergraduate students at the University of Minnesota, Crookston Campus, participated in this pilot course. The purpose was to evaluate the advantages and limitations of this relatively new medium, and to refine the development of this and other wilderness management courses.

Involving technology in the learning process is only useful if students remain active and engaged (Woolf and Hall 1995). With all of its capabilities, the Internet is a tool; like any instrument, its utility depends on the skill with which it is used (Mossbacker 1995; Turkle 1996). Consequently, the effect of computers and the Internet on education depends on how these two are applied (Collis 1996; Reinhardt 1995; Wang and Sleeman 1994). Indeed, experience with computers and the Internet has demonstrated that the instructor is a key figure in the effectiveness of any program that involves technology in education.

> What distinguishes online instruction from entertainment or recreation is the purposefulness of the designers and developers in provoking certain intelligent responses to the learning materials, context and environment (Berge 1996).

A review of distance-education literature reveals a few characteristics of online education beginning to emerge. Some see online classes as the logical next step in the natural progression from computer-mediated instruction in the classroom to distance education (Berge and Collins 1995). For example, as the Internet becomes more widely available, online learning has become more global in nature; the Internet is increasingly capable of delivering instruction to a widely dispersed audience (Blumenstyk 1995; Nye and Owens 1996; Solomon 1995). As a result, traditional barriers of time and space are being reduced or eliminated. In addition, the recognized benefits of computer-mediated education—visualization, problem-solving, interactivity—can also be incorporated into an online course (Baiocco and DeWaters 1998; Kimeldorf 1995; Rieber 1995). This movement toward a new delivery-on-demand style of learning constitutes one aspect of a "new paradigm" in education (Amodeo and Bullowa 1995; Brown and Dalziel 1993; Sherry 1994).

While the Internet may prove an effective tool for education, no medium is a neutral transmitter of information (Altheide 1995). Those who have adopted Internet technology into their curricula have discovered that there are distinct qualitative differences in the learning and teaching environment of an online course, compared to that of a traditional classroom (Gonzales 1994; Kearsley and others 1995).

Advantages of online education have been reported in programs ranging from literature to chemistry, including more interactivity and collaboration, a flexible curriculum, better engagement, more complete knowledge creation, and less dependence on physical facilities (Donlevy and Donlevy 1995; Rieber 1995; Reinhardt 1995; Woolf and Hall 1995).

At the same time, disadvantages have also been recognized, including an overdependence on technology and course content, slow communication and lack of immediate feedback, a lack of experience with the online format, and a wide disparity in what is considered "interactivity" (Applebaum and Enomoto 1995; Maxcy and others 1994; Moore 1995; Pepi and Scheurman 1996; Wildstrom 1995). Consequently, the inherent strengths and inadequacies of the Internet must be understood and planned for to provide an effective learning environment (Collis 1996; Straus and McGrath 1994). Even in these early stages, however, the online format has been perceived as an improvement over traditional correspondence distance education.

The Crookston Pilot Course

The Wilderness Management Distance Education Program (WMDEP) is a collaborative effort between the University of Montana and the Arthur Carhart National Wilderness Training Center. This Program comprises five undergraduate courses with topics ranging from wilderness ecology, philosophy and ethics, to wilderness planning and recreation. The effort to develop interactive online wilderness courses within the Wilderness Program began in 1996. Prior to August 1995, distance-education courses at the

In: Watson, Alan E.; Aplet, Greg H.; Hendee, John C., comps. 2000. Personal, societal, and ecological values of wilderness: Sixth World Wilderness Congress proceedings on research, management, and allocation, volume II; 1998 October 24–29; Bangalore, India. Proc. RMRS-P-14. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

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University of Montana had only been taught by correspondence. Despite sincere efforts to increase the reach of the program, enrollment did not meet expectations.

It appeared that offering one of the courses via the Internet could provide an opportunity to examine at least two things: whether the reach of the program could be expanded through online courses and whether students would be able to realize educational benefits as a result. The question we were obligated to ask was whether the Internet could be an effective medium for presenting a wilderness management course. In other words, does the material lend itself to the online format, and in what ways does the technology benefit or obstruct student learning?

Our interest in online distance education was motivated in part by a desire to improve the reach and quality of the Wilderness Management Distance Education Program courses. From the literature, we identified six functions of a learning environment that we wanted to examine with respect to the pilot course (table 1). Each function corresponds to a characteristic of online education identified from the published results of early studies in other disciplines. They represent a collection of what seemed to us to be the most commonly recognized variables in education. Our intention was to identify whether each function was enhanced or inhibited by the online format of the course. The primary source of data for this information was generated from the self-reports of the students and from our observations within the class.

Before committing the Program to such an effort, however, we decided to pilot test one course and evaluate its performance. "Managing Recreation Resources" (RECM 495D) was selected as the pilot. In a partnership arrangement, the University of Montana and the University of Minnesota agreed to offer the course at the latter's Crookston campus during Winter Term, 1995-1996. A class website was created to contain the student resources for the course, including an online study guide and supplemental readings. To facilitate interactivity, real-time audio and video capabilities provided the class with live group discussions and lectures. Student projects, writing assignments, and individual research were designed around the Internet as well. Although most students participated from a single classroom at the Crookston campus, students could—and sometimes did—connect from home as well.

RECM 495D offered Crookston students the opportunity to interact with an instructor in both locations. It also allowed them additional flexibility with course material. Students were required to read the assigned material before each class time and come prepared for a discussion. Lectures usually consisted of a brief overview by one (or both) of the instructors, followed by a general discussion of relevant concepts. Generally, the overview occurred in an Internet discussion group using typed text, or via live audio/video feed using Microsoft Corporation's "NetMeeting" software. Classroom discussion occupied a majority of each period and allowed students to develop their understanding of the concepts through dialogue and problem solving.

RECM 495D was not meant to imitate the experience of a traditional classroom environment. Nor was it intended simply to add glamour to a previously unexciting "home study" course. Instead, it was designed to add various opportunities for interaction—with the material and instructors—to an existing distance-education course. The purpose of the effort was to refine RECM 495D and justify its initial development, improve the Program's efficiency in developing future curricula, and increase the reach (access) of potential students to the information available within the Wilderness Management Distance Education Program courses. We also felt the pilot course would allow us to explore some of the educational outcomes that others were reporting from their online programs.

Table 1—Evaluation and comparison of RECM 495D.

Function	Traditional classroom	Distance education	Paradigm shift	RECM 495D
Access to information	Poor to moderate	Moderate to good	Should be open, create a global classroom	Good access to information, instructor when technology functioned properly
Relevance, currency of information	Poor to moderate	Fair to moderate	Information should be most current, state-of-art, include outside sources	Moderate to good. Internet format allows material to be updated easily, quickly
Role of the instructor	Teacher, lecturer	Instructor, facilitator	Facilitator, mentor, collaborator	Technical facilitator. Pedagogical collaborator
Student control over learning environment, format	Poor: little control over either within classroom setting	Moderate control over environment. Poor: little control over format	Learner demand, learner centered	Good control over learning environment, moderate to good control over format
Interactivity, collaboration, and engagement	Poor to moderate interactivity, collaboration. Fair to moderate engagement	Poor to fair interactivity, poor collaboration. Poor to moderate engagement	High degree of interactivity, collaboration, engagement	Good interactivity, fair to moderate collaboration, moderate to good engagement
Knowledge creation, problem-solving ability, higher cognitive domains	Poor to moderate knowledge creation, higher cognitive domains	Poor to moderate knowledge creation, higher cognitive domains	Constructivism, mutual learning, problem-solving, highest cognitive domains	Good knowledge creation, good to very good problem solving ability, synthetic and evaluative cognitive domains

There are several reasons for selecting wilderness management as the course material. First, the wilderness audience is dispersed; potential students reside in virtually every country around the world (Queen and others 1998). Second, wilderness issues transcend political boundaries. The need for accurate information and education worldwide has placed wilderness issues in a global setting (Burgess and others 1997). Finally, wilderness provides a good forum for studying ecological, social, geographical, and political principles in general. The eclectic science of wilderness management draws from these and other disciplines and, consequently, provides a meaningful context in which to discuss them.

A cursory look at the types of curricula offered on the Internet demonstrates the need for environmental studies curricula, in general, and a wilderness program, in particular. For example, Cape Software (www.caso.com) publishes an Internet guide to online curricula offered by accredited institutions. Of the 732 courses listed, nearly 52 percent (379) are in the fields of business and technology; 18 percent (132) are in language and education; 17 percent (123) are in the traditional sciences; and 12 percent (86) are in the humanities. Just over 2 percent (15) are courses in ecology or earth science. According to Cape Software, there are currently no online courses or programs that specifically offer wilderness management as part of their curriculum.

The Study

To gather the necessary information to conduct the evaluation, several instruments were devised to query students regarding their assessments of RECM 495D. The approach can best be described as a descriptive/interpretive case study using naturalistic inquiry as a guiding principle. The data gathered in this study came primarily from four sources:

1. Archived discussion from each class period, and reports from participant observers.
2. A telephone/e-mail survey of students during the course.
3. A group interview of participants shortly after completion of the course.
4. A mailed followup questionnaire 3 months following.

The first three sources were qualitative in nature. The followup questionnaire was quantitative and used a Likert scale for students' responses. Each of the four tools had a distinct purpose and provided different information relevant to the study. The e-mail/telephone survey, follow-up questionnaire, and group interview rendered a progressive narrowing of focus; all three operated to organize the students' perceptions into distinguishable themes. On the other hand, the discussion group data put bounds on the students' responses by supporting or challenging their perceptions. The overall design can be characterized as a strategy of triangulation; we felt that combining the advantages of all four would provide a more complete and accurate sense of RECM 495D's performance.

In table 1, six functions of an effective learning environment were presented as a framework for comparing a classroom learning environment, distance education, and the changes recommended within the new paradigm of education. The last column, RECM 495D, identifies the nature of these functions as they occurred in the Crookston pilot course and compares their performance to those identified in the new education paradigm.

Functions of an Effective Learning Environment

Access

"Access" describes the quality and quantity of information available to the student. This is principally a matter of the student's ability to gain useful information through the instructor, the material, other students, and external sources (Carter 1996). In the Crookston Case, improved access is identified in students' responses in the telephone survey to the question: "Why did you take this course?" Following are some examples of their responses:

> It was a 3000-level course that would go toward my degree...there were no other ones that would fit in my schedule.

> Because my advisor picked it out for me. I also felt it would be an interesting course, something that UMC usually would not offer.

This same theme was also noticed in their responses to the question: "Compared to a classroom course, what were the advantages and disadvantages of using the Internet for this course?"

> One advantage to using the Internet for this course was that you could get together with the teacher no matter what the weather was outside, even when school was canceled.

> It was nice to get a look from a different view—a non-Red River Valley view.

> Learning from a different instructor and institution broadened my perspective.

The point illustrated by these responses is that the course filled a need for these students and offered them more flexibility in when and where they learned. It also provided them a way of completing a curriculum requirement while participating in a course that was not usually offered at Crookston. According to the students, access was improved in comparison to the traditional classroom and distance-education environments in nearly every respect. This claim is made with one caveat, however: the various aspects of the access function only operate as long as does the technology. When the system failed, connectivity between the students and the instructors, with the course material, and to a degree even among themselves was no longer possible. This loss of communication was identified by the students as a major shortcoming of the online format. Following are some examples of their responses:

> The biggest disadvantage would have to be the technical difficulties, and being so reliant on the technology.

> A bit frustrating when the network was down and you wanted to do something. Especially when the technology wasn't working very well during the class session.

> The technology has greatly improved, but it does need to be more reliable in order to be less interrupting to the class.

The Crookston class benefitted when the technology was functioning properly. When it wasn't operational, however, it actually impeded the learning process. Consequently, reliable computer technology and network connections are fundamental requirements for an online course to claim improved access.

Relevance and Currency of Information

The paradigm shift in education proposes that the most up-to-date, state-of-knowledge information be presented to learners. Furthermore, the material should have some obvious validity and application to authentic circumstances. Information that meets both qualifications is not only more meaningful to the learner, but likely more useful as well. In RECM 495D, we purposefully drew from a variety of sources to make the material as current and applicable as possible to the Crookston students. The study guide provided a basic direction for the course, as did the texts. Nevertheless, we also brought in research articles, agency publications, maps, anecdotal reports, and other information from a variety of external sources to keep the material as current as possible. These were all incorporated into the course website by various means: on a web page, as downloadable files, and as 'hotlinks' to other Internet resources. Comparing RECM 495D to a classroom course, students observed:

> [An advantage] would be access to resources on the Net...

> The principles were modern and up to date.

In contrast, some students observed that the course could have involved a greater variety of sources and types of information than those that were used. When asked how helpful the photos were in illustrating an issue related to climbing, a student responded:

> Showing the pictures helped a lot...I mean, we don't get a lot of opportunity to experience climbing around here~ [referring to Minnesota]. I thought more of it would be helpful too. Sometimes one picture just doesn't describe it.

From our experience with the Crookston class, it appears that the ability to publish material on the Internet provides a unique opportunity to make and keep course material current. Whereas the information in a textbook may be as much as several years out of date at publication, an Internet website can contain information almost as soon as it is generated. The degree to which the material is relevant to the students may be another matter, however. In this instance, our experience indicates that the relevance of information contained in an online course likely has more to do with the instructor than the format of the course.

The Role of the Instructor

RECM 495D had two instructors in Montana and one at Crookston, but the roles were somewhat fluid from one person to another and from one class period to the next. In spite of this, there were obvious qualitative differences between the instructors' responsibilities in the online class as opposed to those of a teacher in a traditional classroom environment. Instructors were seldom "in front" of the class, even in a metaphorical sense. Their roles thus became more similar to facilitators or collaborators, helping the students discover for themselves rather than directing them to a predetermined conclusion.

The instructor's role as we observed it in the Crookston case was as a facilitator or collaborator, and differed significantly from that of a classroom environment or correspondence distance education. Although the students were not in the same room with the remote instructor, the latter was still able to exert a significant presence on the students. The evidence for this redefined role came from transcripts of the class discussions. From the archived discussion transcripts, we noticed that the students were able to participate rather extensively, even in brief discussions of 10 or 15 minutes. Compared to a classroom setting, where the teacher may do most of the talking, students in the online class were very active in the discussion group conversations.

Student Control Over Learning Environment

A fundamental tenet of a constructivist educational approach is that learners should be given opportunities to create their own knowledge through experience and direct contact. This implies that students determine to a certain extent the conditions of learning, an important concept in the new education paradigm. Toward that end, RECM 495D was structured so that students could have some control over the delivery and content of the course during its operation. For example, the Crookston campus was closed several times during the academic term, first because of snow, and later because of flooding. As a result, several online class periods were canceled as well. To adapt the course material to the shorter schedule, we asked for and considered students' input on which 2-week segment should be dropped.

Indeed, by relying on both the availability of the classroom and on the online technology, RECM 495D became a victim when either one was unavailable. On two occasions, the school campus was closed because of weather, but Internet access was still available. In this case, the online format could have been used to run classes despite the unavailability of physical facilities. Nevertheless, because too few students had Internet access from home, it was impractical to do so. Conversely, there were several occasions when students were in class but a server or its connection malfunctioned. In these instances, the lesson plans were interrupted for those class periods.

When students could not be connected in real-time (when the in-class discussion was occurring), they would read the posted messages after the fact. On other occasions, students would review discussions from a previous class period in preparation for an upcoming class or exam. The Crookston students reported that the discussions were useful for keeping current after having missed a class. As a result, our observation of the pilot course suggested that learner control was generally greater than it might have been in a classroom, and better in many respects than in correspondence distance education.

Interactivity, Collaboration, and Engagement

A theme that permeates modern learning theory is that for learning to be effective, it must be active (Bates 1990). For information to be meaningful, it is essential that the learner interact in some way with the material. Interactivity describes the association between the student and the material, or the student and his/her peers. Collaboration denotes the intellectual relationship between one learner and another. Engagement is the amount of involvement that exists within either of these relationships—the strength of the connection. Engagement is a measure of the amount and quality of participation a learner demonstrates while "on task."

Problem-solving activities were a significant part of the regular class discussions. Students were presented with scenarios in which they were to apply newly acquired knowledge of wilderness management principles to help them resolve the dilemma. They reported that the scenario-based discussions were an effective tool for learning, and a significant determinant of their engagement in the class. Samples of the students' responses include:

> I liked the audio and video [live] parts of the class, but the different situations that were given each day [scenarios] were a good idea too.

> I liked the interaction between all of the students—being able to hear what everyone else had to say.

From our own observation, we determined that the students were generally attentive and thoughtful in their responses to questions posed in the scenario discussions. We also noticed that they were able to draw on new information presented in the readings and in class to reason through the problems presented. Furthermore, they appeared to be able to focus on the discussion and spend considerable time engaged in it.

Later on in the academic term, we also observed that the interaction among the students increased noticeably. In comparison to traditional distance education, these are all significant accomplishments. The interactivity observed in the Crookston class resembles the interaction that occurs in a classroom; if anything, more students had an opportunity to participate in class discussion at the same time in the pilot course. This is an indisputable advantage for normally hesitant students, and one that was recognized by them as well.

Knowledge, Problem-solving, and Higher Cognitive Domains

The final focus of our effort in developing the online version of RECM 495D was to apply principles of effective education as described in learning theory and outlined in the new paradigm of education. In other words, we wanted to provide opportunities for the students to operate in the higher levels of cognition. This objective required us to thoughtfully consider the structure of the Crookston course as well as the content of the material. To do so, we determined to involve the students as much as possible in this endeavor.

Our intent was to frame the information presented in class in ways that would stimulate the students' thought processes. By making the information relevant, we expected that they would apply their newly learned information to real-life situations. Vygotsky (1978) describes learning as a social process that is intimately dependent on conversation. Providing an opportunity for discussion, as an integral part of the learning process, allowed students to negotiate the meaning of the material they were being exposed to and find application for it. The problem-solving scenarios and subsequent discussions performed an indispensable function in this regard.

The benefits of the scenario-based discussions have already been noted. It should be apparent at this point that the students enjoyed the challenge of problem solving. Rather than simply deliver information and test the students' ability to retain it, we presented open-ended discussions so that the students could draw on any resource at their disposal (knowledge, experience, reason, information, intuition, etc.) in responding to these situations. What we discovered is that the Crookston students seemed unaccustomed to this approach at first, requiring several class periods before they became comfortable with it. Their hesitance to become engaged initially may have been a result of previous classroom experience, or perhaps a response to the novel format of RECM 495D. In any event, they became more involved as the class progressed. In fact, the students rated the scenario-based discussions as the most useful of all the activities in the class:

> You know, I've never been in a classroom with that in-depth of a conversation. Even though we weren't talking to each other. Even though it takes a little longer to read everything, I thought it was great.

> That's the part I liked best too, is that everyone could "talk" at once and we could respond to each other.

Conclusion

Table 1 reproduces the characteristics of the six functions of an effective learning environment as they compare across formats. It includes our assessment of how the Crookston class performed with respect to each function, based on information derived from the students' reports and our own observations. Generally, access to the material and the instructor was better in the Crookston class than in a traditional classroom setting. In some respects, it was an improvement over correspondence distance education as well. The advantage of online distance education with respect to access appears to be that it allows students contact with the instructor. The disadvantage of online distance education in terms of access is that successful operation requires a significant amount of technical infrastructure on the delivery end, reliable network connections, and student access to a personal computer and modem.

The online version of RECM 495D provided students with improved control over the learning environment. They were able to log in from home, work, or any place that provided Internet access. To some extent, they were also able to influence the amount and content of the lesson material covered in class. To the degree the Internet and online

technology was part of the learning environment, students were able to manipulate information within that domain rather extensively. The instructors assisted in this process as technical consultants or facilitators. A more important instructor role, however, may have been to direct the students to relevant and timely information and help them understand the meaning of those concepts.

Perhaps the most notable accomplishments of the Crookston course occurred in the areas of interactivity and the creation of knowledge. Feedback from the RECM 495D students and our own experience indicates that the capabilities built into the online format provided effective opportunities for student-student, student-instructor, and student-material interaction. Using multimedia resources such as photos and maps helped students to conceptualize the principles being discussed. Problem-solving scenarios effectively engaged their interest in applying new knowledge and experiencing its operation in authentic situations. As a result, students often operated in the higher cognitive domains of learning. They demonstrated attention, curiosity, perception, reasoning, and understanding. Overall, the Crookston course successfully incorporated many of the principles described in the new paradigm of education.

The task for the future will be to expand our understanding of the characteristics of online education. As these functional attributes become established, we expect to encounter more opportunities to take advantage of them in designing and producing wilderness distance education curricula. We also expect that the result for wilderness students will be a more effective distance learning environment and improved access to wilderness education.

Since we evaluated this pilot course, the University of Minnesota, Crookston has contracted for two more online courses. Humboldt State University in northern California has also received a course. This recognition by our colleagues has a very encouraging effect on the further development of the program. Information on the Wilderness Management Distance Education Program can be found at www.wilderness.umt.edu.

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A Macro-Micro Environmental Management Model Currently Being Used in KwaZulu Natal, South Africa, to Protect Wildlands in Peri-Urban Settings

Roland Goetz

Abstract—Conservationists face an endless battle against the effects people have on the environment, whether they live in formal or informal settlements, within Reserves or on their boundaries. Msinsi Holdings (PTY) LTD is a private conservation company that, through sustainable environmental management, community development, and sound business principles, continually strives to uplift the human spirit. Macro and micro strategies employed to accomplish this mission are discussed.

Conservationists face an endless battle against the effects people have on the environment, whether they live in formal or informal settlements, within Reserves or on their boundaries. This is evident from reports of squatters in Zululand's vital Dukuduku Forest, whose slash-and-burn farming methods are wreaking havoc on the ecology of the area.

In other conservation areas near Durban, KwaZulu Natal, bark stripping, erosion, poaching, deforestation, litter, and the pressure of domestic dogs are a few of the problems Reserve staff members have to combat. To come to terms with these problems, the needs of the surrounding communities need to be addressed. This has to be done in a sustainable way to ensure that any development can address the needs of the people but at the same time ensure the environmental integrity of the area. Thus, sustainable development can most effectively be defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland 1987). Clearly, the Brundtland statement has a strong people-centered ethical stance, concentrating on the satisfaction of human needs rather than, for example, on protection of the environment in general or on other species as deep ecologists would.

In the developing world, the harsh reality of people's situations dictates that community needs are recognized. The number of desperately poor people has remained steady at about one-fifth of the human race. These are people who live on the edge of survival. Their living conditions, housing, health, and nutrition are an insult to the notion of equity.

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For more than a century, people have wanted to preserve species and ecosystems, but during the last few years, the loss of biodiversity has been viewed as a threat to sustainable development. It is against this background that the "Macro-Micro" management strategy, as employed by Msinsi in the protection of wildlands in peri-urban settings in the province of KwaZulu Natal, South Africa, has its importance.

It all began with Shongweni Dam, which was originally Durban's largest source of potable water, owned and managed by Umgeni Water, the local water authority since 1983. The Dam's capacity had been considerably reduced by siltation during the 1959 floods, and the problem was aggravated by the floods of 1987. For this and other reasons, a decision was taken to decommission the Mlazi system, including Shongweni Dam.

Conscious that the 1,700 ha Shongweni Estate would inevitably become environmentally degraded unless properly managed, and aware of its biological importance and its potential as an ecotourist attraction, Umgeni Water began searching for an organization prepared to undertake the Estate's management as a nature Reserve. After the Natal Parks Board, the KwaZulu Bureau of Natural Resources, and the Wildlife Society had turned down the opportunity, Umgeni Water commissioned a strategic planning exercise involving Dr. Ian Player, the founder and vice-chairman of the Wilderness Leadership School (WLS). Dr. Player was convinced that the Shongweni Estate, if properly managed, would be both environmentally important and potentially profitable.

Dr. Player proposed to Umgeni Water that the WLS take over the management of the Shongweni Estate. To avoid endangering the WLS's tax-exempt, fund-raising status, it was necessary to undertake this through a new company, Msinsi Holdings (Pty) Ltd., with 100 percent equity held by the Wilderness Foundation, which administers trust funds on behalf of the WLS.

The Shongweni Resources Reserve (SRR) was formed in April 1992, formally taking over control of the Estate in August of the same year. As Msinsi's first project, the SRR was developed along ecotourism lines, drawing on the local community to create infrastructure to take advantage of the opportunity the Reserve provided as a financial catalyst for the area.

Msinsi was later appointed to develop and manage the environmentally sensitive Nagle Estate and Inanda Dam environs in a sustainable manner to preserve the water quality of Durban's main storage dams. In a fourth project, the organization was appointed to assist with the development and continued enhancement of the well-known public

bird-watching area at Darvill Wastewater Works. Albert Falls and Hazelmere Resources Reserves were acquired when the Natal Parks Board chose to withdraw from these areas.

Operational Philosophy and Approach

Drawing from the Zimbabwean "CAMPFIRE" philosophy, a model for community conservation in Africa where communities are responsible for their own success, Msinsi has created a blueprint for the sustainable upliftment of communities within an ecologically sensitive area.

With Msinsi Holdings making use of other external organizations such as the KwaZulu Training Trust's Community Empowerment Program, local development committees and regional development liaison committees are established in the local community. This procedure involves working with communities at the grassroots level and creating institutional capacity.

This work has included training elected community representatives in the areas of financial skills, committee training, management, and functional literacy. Further training offered to community members includes building skills, plumbing, life skills, water conservation, and water health education.

The Msinsi Holdings logo, the three-part Erythrina leaf, supports the organization's tri-modular approach to address the challenge of integrating conservation and sustainable community development. This approach includes environmental management, sound human resource development, and business and financial principles through:

- Identification and documentation of natural resources in the form of a natural inventory.
- Identification of possible threats, both current and potential, to the quality of the environment.
- Establishing the needs of the surrounding local communities, with respect to natural resources utilization and upliftment of their standard of living.

Once these initial steps had been established, management proceeded to develop a proactive management plan, which addresses the above three steps and achieves the ultimate goal of successfully integrating conservation and sustainable rural community development in Msinsi areas, where the ecological quality of the Reserve improves and the local communities enjoy the benefits previously referred to.

The proactive management plan constitutes two main sections: macro-scale management goals and strategies, and micro-scale management strategies.

Macro-Scale Management Goals and Strategies

Community Liaison and Participation

The critical variables that could lead to the success or failure of the Msinsi project are the perceptions, attitudes, and actions of the local communities residing on the boundaries of the Reserve. Consequently, it is critical that the position and policy of Msinsi be conveyed to the community at large, and in particular, the mutual benefits that can be enjoyed by a partnership approach. Therefore, it is essential that all macro, as well as some micro, management strategies be discussed with the communities and that these management strategies focus to a large extent on extensive community participation (fig. 1). Macro management strategies would then include community liaison and participation as essential elements.

The first and all-embracing strategy would be to provide education for all sectors of the community (both young and old) concerning the importance of resource conservation and population stabilization. Here, it is important for governmental and nongovernmental bodies to offer formal as well as informal education to the people.

The second strategy would be to improve maternal and child health care, addressing aspects such as:

- Parental and postnatal care at local levels.
- Educating families on the importance of simple hygiene.
- The local availability of family planning services.

Thirdly, it is important that opportunities and encouragement exist for families to become economically and socially self-sufficient. This would negate one of the traditional reasons for having large families. This has been achieved through encouraging communities to use their traditional skills to sell crafts to tourists, not only for economic gain but also to promote their heritage and social stability. Experiential learning has also been facilitated to expose communities to conservation and its benefits.

A novel concept that is being planned in Msinsi areas is the idea of community controlled conservation camps (fig. 2). Here, areas of community land adjacent to the Reserve can be fenced into the Reserve. In these areas, bush camps or similar overnight accommodations will be built. These camps will be maintained and administered directly by the community, and all monies will be used for the development of the various communities concerned. The conservation and fencing expenses could be paid for by the Reserve. This concept has the potential to create economic opportunities that can

Figure 1—Field Ranger liaison with members from local communities that surround Shongweni Resources Reserve.

Figure 2—Eight-bed bush camp at Shongweni Resources Reserve.

contribute to a level of economic, and therefore social, independence being attained. If relevant education, affordable and easily available health care, and adequate economic opportunities are created within the context of the local community, the long-term goal of population stabilization and resources conservation could be attained.

Baseline Study, Evaluation, Monitoring, and Trends

Environmental and socio-economic baseline studies for areas in which Msinsi operates are as important to the success of the project as the community integration mentioned earlier. Baseline studies are important because they enable the project management to evaluate situations and monitor trends and progress. Potential problems can either be avoided or met with timely and appropriate responses.

Micro-Scale Management Strategies

Micro-management strategies relate particularly to activities within the boundaries of the Reserve. These management programs, as set out in the Reserve's management plan, strive to conserve the optimum number of appropriate indigenous species and their habitats, maintain breeding populations, and protect these gene pools. Natural, physical, and ecological processes will be allowed to operate without interference except under imperative circumstances, and at the same time allow utilization of the Reserve for educational, research, and recreational purposes. Further, any imperative consumptive utilization of a renewable natural resource must be sustainable and not in conflict with recognized conservation morals.

Land Use Categories

The Reserve must be divided into a number of zones. Only those activities relating to policies for each zone will be permitted.

1. Intensive Use Zones—Areas characterized by substantially modified natural environment. Sights and sounds of man are readily evident and the concentration of users is often moderate to high. This zone includes accommodation, camp and caravan sites, staff housing, service facilities, and high-density recreation.
2. Limited Use Zones—Areas characterized by a predominantly natural environment with moderate evidence of the sights and sounds of man. Rustic facilities such as picnic sites, bush camps, game guard outposts, and game viewing hides may be provided. Roads for motorized public transport are provided.
3. Wilderness Zones—Areas characterized by lack of access roads open to the public.
4. Special Zones—An area set aside in recognition of an important site that would receive the highest conservation priority and may require special protection measures. Examples of such sites are: breeding sites of rare species, rare or endangered ecosystems or components, important historical and archaeological sites, areas occupied by species of limited distribution or special significance, sites for long-term research or monitoring, and ultra-sensitive areas.

Management of the Reserve would include soil conservation, ensuring that accelerated erosion is attended to and vegetation conserved, and maintaining the diversity and breeding populations of the indigenous plant species occurring in the Reserve. Fire management forms part of this area of management as does the control and elimination, where possible, of unwanted alien plants (fig 3).

Conservation of fauna includes maintaining diversity and breeding populations of indigenous animal species occurring in the Reserve, removal of alien species, and restocking animal species that historically occurred or are deemed important for either conservation or ecotourism reasons.

Fisheries and hatcheries also form part of this management objective, as do the protection of catchments and water resources, as well as the control of any sources of pollution, and the management and preservation of existing archaeological, palaeontological, and historical sites. Research necessary for the effective management of the Reserve to achieve set objectives is carried out in both the short and long term.

Figure 3—Alien plant control.

Administrative management is carried out to ensure that all infrastructure is properly maintained in an acceptable state of repair. Suitable fences are erected and maintained to control animal movement, to demarcate boundaries of the Reserve, and to protect personnel and their possessions or any equipment and building against theft, damage, or destruction from human or animal sources.

Other areas include the provision of services to visitors. This includes controlled usage by visitors to the best extent compatible with conservation requests. Finally, the control and management of finances is carried out to ensure the effective running of the Reserve.

Conclusion

The way forward for conservation of natural resources in developing countries needs to take note of people's needs while at the same time ensuring that this is done in a sustainable way. Partnerships need to be developed by all stake holders to ensure that, in the words of the Vice President of the United States of America, Al Gore (1992), in his book, "Earth in the Balance," "The real solution will be found in reinventing and finally healing the relationship between people and the earth."

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Russian Zapovedniki in 1998: Recent Progress and New Challenges for Russia's Strict Nature Preserves

David Ostergren
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Abstract—Zapovedniki are pristine ecosystems that restrict all economic utilization and are designed to act as areas for ecological research and "natural controls" for comparison to other land uses such as agriculture or resource extraction. The most recent threats to zapovedniki originate from the dissolution of the Soviet system and resultant economic instability. Since 1991, zapovedniki have maintained their role in Russian society by increasing contact with international nongovernment organizations, using legislation to increase their ability to enforce the law, expanding environmental education, and diversifying funding strategies. Despite their efforts, the reduction in federal support overrides most efforts to fulfill the mandate of biodiversity conservation, ecological monitoring, and environmental education.

Zapovedniki are a unique contribution to the global wilderness community. They are specially protected natural areas that restrict economic utilization or human activity such as logging, mining, farming, hunting, fishing, firewood gathering, or recreation. In theory, zapovedniki are pristine ecosystems designed to act as areas for ecological research and "natural controls" for comparison to other land uses such as agriculture or resource extraction (Kozhevnikov 1908; Shtil'mark 1995; Shtil'mark 1996). The first preserve, Barguzin Zapovednik, was established in 1916 by a regional government to protect a sable population (*Martes zibellina*) near Lake Baikal. Although several more zapovedniki were established by local and provincial authorities, it was not until 1919 that the first federal zapovednik (Il'menskii Zapovednik) was established (Weiner 1988). This was the first area in the world to be protected primarily for scientific reasons. Since that time, federal, regional, and local government bodies, the Federal Forest Service, or the Russian Academy of Science were authorized to designate ecologically, geologically, or biologically unique or sensitive areas as zapovedniki (Pryde 1991). By the late 1950's, zapovedniki were established in many ecosystems throughout the Soviet Union.

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Threats to Zapovedniki

Throughout the decades, zapovedniki have survived a variety of threats to their operation and existence. The threats have included:

- Challenges to the original policies and intent (Shtil'mark 1995; Weiner 1988).
- Reductions and reorganizations by political leaders (Boreiko 1993; Boreiko 1994; Pryde 1972).
- Alternative use and designation (Pryde 1991).

Nonetheless, zapovedniki persevered within the communist, centrally planned economy through 8 decades of shifting prosperity and turmoil. The most recent threats to zapovedniki originate from a more profound source—the complete dissolution of a political system and the associated conditions of economic downturn and social instability (Ostergren 1997; Ostergren and Shvarts 1998; Stepanitski 1997). Until 1991 the zapovedniki were a line item budget for the federal government. Each preserve was allotted money for (1) government inspectors to protect the preserve, (2) scientists to conduct research, (3) support staff, and (4) materials and maintenance. The fall of the Soviet Union changed the way zapovedniki are managed in that directors now spend a significant amount of their time raising funds, nurturing political support, and devising new strategies to do more with less funding.

From 1991 to 1995, the zapovednik system struggled to survive under difficult circumstances. Directors at the preserves found themselves with entirely different responsibilities. Because the management lacked sufficient federal funding, government inspectors were paid infrequently or not at all, trespassers poached wildlife for the newly accessible foreign animal parts market, research scientists moved to other jobs to support their families, and essential equipment deteriorated. As one example of a change in support and management techniques, during the Soviet era, helicopter support from the national air service (Aeroflot) was common on established preserves. The Sayano-Shushenskovo Zapovednik was allotted 150 flights to haul supplies to field stations, conduct patrols, and support ground-based inspectors. Of those 150 flights, the scientific staff was allocated 40 helicopter flights a year at the scientific director's discretion. In 1995, they received five (5) helicopter flights to manage a 390,000 hectare preserve with virtually no road access. These circumstances demand boat transport to the zapovednik and then travel by horse or foot through the preserve.

In Central Siberia, zapovedniki with a long tradition of research have cut back on projects and have little or no

helicopter support for research or border patrols. New zapovedniki established after 1991 have never had helicopter support (Ostergren 1998). As the funding levels dropped, directors began to turn to alternative techniques for managing preserves. Each director sought outside funding with varying degrees of success from local, regional, and international funding sources. This presentation will provide an update on the challenges, status, and management conditions for zapovedniki in 1998. In particular, we focus on zapovedniki located within Russia. In 1997, despite the challenges in management and a chronic lack of funding, 22 preserves have been added since 1991 for a total of 99 preserves set aside from economic exploitation, protecting over 31,000,000 hectares of diverse ecosystems across Russia. Figure 1 shows the distribution of Russian zapovedniki in 1998.

Recent Progress for Zapovedniki

Shortly after the 1991 fall of the Soviet Union, nongovernment organizations (NGOs) emerged into the political and civil vacuum left by disappearing state committees. In the field of biodiversity conservation and environmental protection, zapovednik directors, natural resource scientists, and environmental activists needed a forum and central source of information to coordinate their efforts. One organization that has been fundamental to progress in advancing protected area status is the Biodiversity Conservation Center (BCC) of the Socio-Ecological Union. The BCC became an advocate for protected areas serving as a consultation, information, and fund-raising center for biodiversity conservation. An excellent source of information on the BCC and related efforts is their web page, http://www.igc.apc.org/bcc-west/, or for a more in-depth look at conservation efforts in the 1990's, the authors suggest referring to the English language publication "Russian Conservation News" (RCN). A subscription for RCN is available through the Pocono Environmental Education Center PEEC/RCN R.R. 2, Box 1010, Dingmans Ferry, PA 18328. In Russian, an excellent source for current information is "Informatsionii Bulletyen" from the "Tsentr Okhrana Dikoi Priroda." Both literature sources address issues for zapovedniki, as well as national parks and wildlife refuges.

Legislation

Directors and supportive NGOs requested federal legislation to provide a mandate and legal standing—an "organic act"—for their activities and enforcement (Ostergren 1997; Shtil'mark 1995). 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 for zapovedniki, including six primary responsibilities: (1) the conservation of

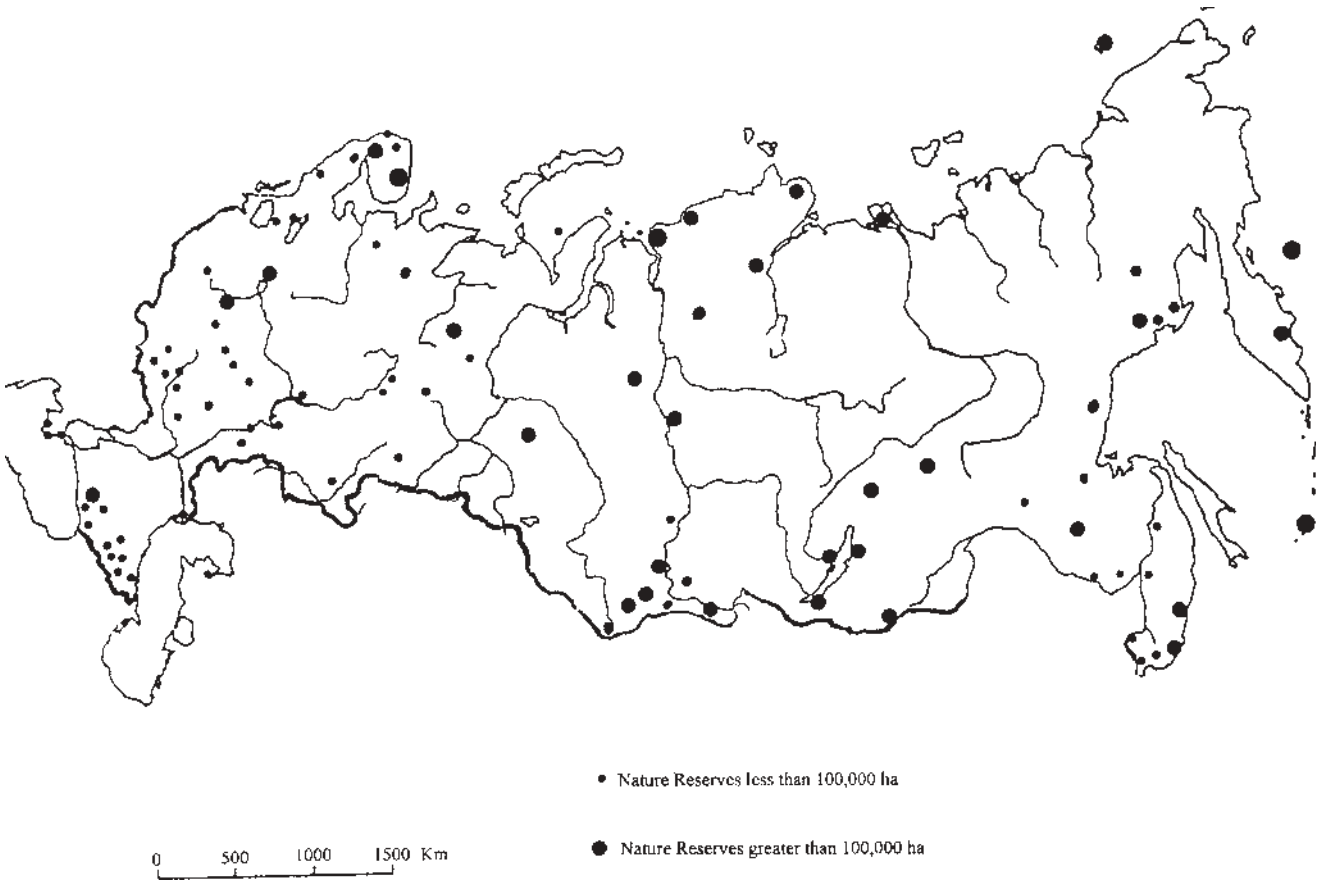

Figure 1—Distribution of Russian Protected Areas.

biodiversity, (2) the preservation of unique or typical natural areas for scientific research, (3) long—term ecological monitoring, (4) providing conservation training for professionals, (5) initiating environmental education programs (which may include limited tourism), and (6) providing expertise in the environmental impact of regional development projects. For the first time in history, Russian legislation specifically described the rights and responsibilities of zapovednik employees. The legislation consolidated and legitimized a long history of protection and research on zapovedniki located across Russia's landscape (Federal Law 1995). The majority of zapovedniki are concentrating on the first three goals that date to 1908, and more slowly incorporating the last three goals (Sobolev and others 1995).

Central Administration

In July 1995, after lobbying by zapovednik directors and organizations such as the BCC, the Ministry of Environmental Protection established the Department of Nature Reserve (Zapovednik) Management. Vsevolod Stepanitski was appointed to head the new department. Historically, zapovedniki were spread out through various administrative authorities such as local and provincial authorities, the Ministry of Hunting and Game Preserves, the Ministry of Forestry, or the Russian Academy of Science. Although associated with each other in many respects, the preserves lacked a single, unified agency to lobby for their needs and interests (Pryde 1991). Establishment of a centralized department in Moscow provided essential support for the survival of zapovedniki in Russia. The initial focus for the new department was protecting the borders and enforcing laws that prohibited trespass or utilization of resources from the zapovedniki (Williams 1995). Prior to 1995, employees lacked the authority to make an arrest or file suit against offenders. If an employee needed to arrest a poacher, they enlisted the support from the local militia or police—an awkward, time-consuming process. Although each zapovednik is still struggling to pay salaries and maintain a staff, the support from a central administration combined with the 1995 Federal Law for Specially Protected Natural Areas gives the zapovedniki a sense of direction and legal strength.

System-Wide Growth

Paradoxically, despite decreasing funding since 1991 there has been a growth in the zapovednik system. In 1991, there were 77 zapovedniki within Russia's borders. In 1998, there are 99 zapovedniki and 93 are active—a 30 percent increase since the fall of the Soviet Union. Six preserves are so new they are considered "paper preserves" (Stepanitsky 1998) The paper preserves have no staff or a small volunteer staff, no mechanism for conducting research, and no government inspectors to protect their borders. Although some directors and activists object to paper preserves, the benefits seem to outweigh the drawbacks. Several benefits include: (1) property ownership has not been determined in many areas of Russia, and therefore property is relatively cheap—essentially free—for the government; (2) endangered species need habitat protection, and setting aside land now will make any future transition to active management much easier; (3) the Russian government has repeatedly stated its intention to have 5 percent of Russia protected by 2005—again a relatively cheap method for realizing this goal; and, (4) preserves are political recognition for scientists and the environmental community, which may demonstrate that the Russian government is still concerned about the environment. In a process similar to the Soviet era, the 22 new preserves have been established through the combined efforts of scientists, local conservationists, and Russian conservation organizations. A post-Soviet addition is that international conservation organizations have donated time, money, and staff to support initiatives to establish new zapovedniki (Sobolev and others 1995).

International Conservation Organizations

Another positive result from the fall of the Soviet Union is the increased contact with international conservation organizations. In April 1997, the British Environmental Know How Fund supported the development of management plans for two zapovedniki and one national park (Grigoryan 1997). Organizations such as Pacific Environment and Resources Center (PERC) and the World Wide Fund for Nature (WWF) have been donating time, staff, and funding for several educational initiatives, computer support, training sessions, and conferences. In December 1997, PERC and the Chazy Ecofund in Abakan organized a conference for southern Siberian protected areas. The conference concluded with a master plan for the region to initiate a comprehensive program of biodiversity conservation. Further evidence of international assistance is that the World Conservation Union (IUCN) has representatives in Russia; the United Nations Educational, Scientific, and Cultural Organization's (UNESCO) Man and the Biosphere program has disseminated computer software and training to standardize information from the 17 zapovedniki that are biosphere reserves; and cooperative projects and staff exchanges have been organized through the U.S. National Park Service and the U.S. Fish and Wildlife Service. In addition, international research universities are working with zapovedniki and have targeted investigations in areas of particular interest such as the Russian Far East (Amur Leopard, Siberian Crane, and Siberian Tiger) and migrating birds nesting in the Arctic Tundra.

Environmental Education

A recent addition to management strategies for zapovedniki is environmental education. The theory is to increase political support by educating young people about the purpose and role of zapovedniki in Russian society. The long-term expectation is that as adults the students will be less likely to violate the zapovednik regime and more likely to support helpful legislation. The scientific staff on Katun Zapovednik indicated early successes in 1995 after they initiated an outreach program to the schools (Ostergren 1995). In 1996, with support from the World Wide Fund for Nature and the Swiss government, a Zapovedniks' Environmental Education Center opened in Moscow. The goals are to develop funds and contacts for education, create and adapt educational

methodologies, create vivid public education programs, and support local initiatives in environmental education (Menner 1996). Because using the zapovedniki for educational purposes may open them up to the general public, some experts caution against too much access. The primary function of the preserves is protection and monitoring relatively pristine ecosystems. On the other hand, education is viewed as a service to society and necessary to generate and maintain political support. The Education Center believes the zapovedniki are still evolving and defining their role in society as we enter the 21st century. Careful consideration should be given to the advantages and disadvantages of environmental education for zapovedniki (Danilina 1997).

New Challenges For Zapovedniki

Despite the many positive steps for zapovedniki since 1991, most of the news is bad. The single largest problem for zapovedniki is a lack of funds. From 1991 to 1995, the federal budget shrunk by 60 to 80 percent for all zapovedniki. The result was a cut in salaries for inspectors, scientists, and staff, a shortage of equipment, a drop or elimination of access to helicopters, a reduction in border patrols, a reduction in the number of research projects, and a reduction in the number of cooperative research projects with Russian universities. As directors reacted to the problem, they spent more and more time raising funds from a variety of sources including regional ecological funds, and international research and grantmaking institutions. Innovative solutions included the Altai Zapovednik trading apples for gasoline, inspectors in remote Arctic stations trading salted fish for helicopter support, and the Putoranski Zapovednik helping collect museum specimens on wildlands outside of the zapovednik (Ostergren 1997).

In 1995, the Department of Zapovedniki in Moscow began to keep records of violations on the regime of the protected areas. In the 1997 reports of zapovedniki protection services there were 3,503 formal charges (compared to 2,596 in 1996). Violators received penalties in 1997 from administrative fines of 246,745,000 rubles (U.S. $40,225—6.134 rubles/dollar in May 1998) and 326,481,000 rubles (U.S. $53,225) from suits in compensation for damages inflicted on the nature complex (Stepanitski 1998). The 1995 Federal Law on Specially Protected Areas has proved very useful by authorizing zapovednik inspectors to make arrests and file law suits. Table 1 provides a summary of violations for 1996 and 1997 (Stepanitski 1998). These reports are from 93 active zapovedniki.

Several reasons have been postulated for the increase in violations. One is that government inspectors are becoming more efficient at detecting and apprehending violators. In addition, because inspectors are aware that the Department of Zapovedniki in Moscow is interested in these statistics, an increase may be due to increased reporting. However, the largest proportion of increases is due to the social and economic climate of Russia. Fewer restrictions on movement across Russia's borders mean that poachers have a greater access to international animal parts markets and thus have a greater incentive to violate the regime. The Altai Zapovednik reported an increase in Musk deer poaching in 1993 and 1994 as the price for musk increased. As the price declined in 1995, so did the poaching. Poachers have become more bold as evidenced by an armed raid to steal horses at a government inspector's station on the Altai Zapovednik, and on Lazovski Zapovednik two inspector stations were burned down.

A significant motivation for poaching and trespass is survival. As unemployment rises and food becomes scarce, locals neighboring the zapovedniki turn to hunting and gathering as a source of sustenance. At nearby settlements and summer homes, people gather firewood, berries, mushrooms, and medicinal plants on a regular basis, although they rarely venture far into the preserve. On the Stolby Zapovednik, evidence of poaching elk and deer is increasing on the periphery of the preserve. Despite increased poaching, Director Knorre believes that the interior of the preserve is largely untouched by poaching and trespassing. The greatest strength for zapovedniki in times of economic stress is their sheer size or remote location.

The Collapsing Budget

In 1998, the proposed budget for all 99 zapovedniki was 43 million rubles (U.S. $7 million). According to Vsevolod Stepanitski in a recent press release, the Department of Zapovedniki was informed that their budget has been reduced to 12 million rubles (U.S. $2 million in a constant exchange rate). This was before the devaluation of the ruble in September 1998. The only item that is supported by the federal budget is the salary line item. No money has been

Table 1—A summary of violations on 93 zapovedniki in 1996 and 1997.

Violation	1996	1997
Wood gathering and cutting	171	214
Haymaking and pasturing livestock	80	46
Hunting	439	434
Fishing	712	1,007
Collecting wild vegetation	219	461
Taking land and building	38	9
Travel by foot or automobile through the area or parking in the protected area	710	1,007
Pollution	58	45
Irresponsible fire and burning of forest on adjacent lands	41	63
Poaching ungulates	94	123
Poaching large predators		4 (including one polar bear and one Himalayan bear)

allocated for maintenance, research, or education. Stepanitski suggests that even with some outside funding the system is in deep trouble. A long-range, multi-pronged approach is necessary to protect Russia's environment. Federal funding ought to be sufficient to keep the reserves functioning at least on a maintenance basis. Now the directors are faced with the choice of cutting meager salaries or letting some staff go.

As of September 1998, several zapovedniki have reported the worst conditions since the fall of the Soviet Union. According to the director at the Kandalaksha State Nature Reserve, they have only 20 percent of the budget of 1992. The staff describes it as a catastrophic situation for the preserve. The overall budget in 1998 consisted of 90 percent from federal government, 0 percent from international NGOs, and 10 percent from local governments. There is a 70 percent reduction in the number of inspector stations on the borders, and the number of government inspectors is down 50 percent. The staff at Kronotskiy Zapovednik report that the 1998 budget is 10 percent of 1992—a drastic reduction. They had 27 inspectors in 1992 and now only 15. The budget for Lazovski Zapovednik in 1998 is much worse than the budget in 1992. Again the federal budget only provides funds for salaries, and since June 1998, salaries have been reduced yet again by 50 percent. Several government inspectors left their jobs stating that the salary is just too low.

Conclusions

Since 1991, zapovedniki have maintained and promoted their role in Russian society by:

- Contacting international NGOs.
- Using legislation to increase their legal status and ability to enforce the law.
- Expanding their environmental education program.
- Diversifying their funding strategies.

Despite their efforts, the massive reduction in federal support overrides most efforts to fulfill their mandate of biodiversity conservation, ecological monitoring, and environmental education. Director Stepanitski has appealed to the Duma for support, but the legislative body seems unlikely to change this year's budget.

In light of current conditions for zapovedniki the following questions remain. What will zapovedniki do in the next 2 to 5 years to survive? How can the international community support this unique system of wilderness preserves? In the short term, the authors recommend that the international community support the zapovednik system by:

- Recognizing its contribution to global biodiversity and wilderness preservation.
- Encouraging international NGOs to support both small and large zapovedniki.
- Promoting cooperative research projects on zapovedniki.
- Supporting ecotourism and scientific tourism that injects income or supports research on a wide range of zapovedniki.

Zapovednik directors, administrators, scientists and nongovernment organizations concur that long-term solutions will come from within Russia. However, the international community can support zapovedniki through a variety of methods and send a message to the Russian government that this unique system of protected areas is a national and global treasure that deserves federal support and long-term investment.

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Participatory Technology Development for Community-Based Wildlife Management in Zimbabwe: The WWF for Nature Support to CAMPFIRE Project

R. D. Taylor
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Abstract—In the development of Community-Based Natural Resource Management (CBNRM) programs in Zimbabwe, the role of local communities has been restricted largely to that of passive recipients of wildlife revenue. The World Wide Fund for Nature (WWF) support to the Communal Areas Management Program for Indigenous Resources (CAMPFIRE) project allows wildlife producer communities to participate more fully in wildlife management activities. Contribution is in four areas of participatory technology development (PTD) undertaken over the past 3 to 5 years, namely land use planning, wildlife census, quota setting, and financial management. The need for an integrated participatory approach to resource management has been answered through these methodologies and their link directly with management. It is expected they will be of lasting value and provide an important platform for sustainable natural resource use, biodiversity conservation, and institutional change.

Throughout pre-independent southern Africa, conservation policy and practice alienated most rural people from their wildlife resources. Over the past decade, however, a number of initiatives in the region have sought to return rights of access to these natural resources through legislative change, devolved responsibility, and economic empowerment. In Zimbabwe, CAMPFIRE (Communal Areas Management Program for Indigenous Resources) (Martin 1986) is an innovative example that seeks to place the proprietorship of natural resources, especially wildlife, with the people living most closely to them. The legal and administrative framework for CAMPFIRE evolved out of the successful devolution of wildlife user rights to large scale commercial farmers, provided for in the 1975 Parks and Wild Life Act (Anon. 1975). This Act was amended in 1982 to give Rural District Councils (RDCs) in the communal lands of Zimbabwe similar rights, known as Appropriate Authority. Such authority allows districts to manage and benefit from wildlife resources occurring within them.

To date, most districts have chosen to lease both consumptive (such as sport hunting) and nonconsumptive (such as photographic tourism) wildlife rights to commercial partners. The CAMPFIRE guidelines (Child 1995) for wildlife-derived revenue require that at least 50 percent of gross income is devolved to communities (in wards and villages) living with wildlife, the so-called "producer" communities. Up to 35 percent can be allocated to expenditures on wildlife management activities in the district, with the remaining 15 percent being retained as a district levy. In real terms, the revenue earned by district councils has increased from U.S. $350,000 to $1.6 million between 1989 and 1995. Some 92 percent of the revenue earned comes from the lease of sport hunting rights to private sector safari operators. Of this, nearly 60 percent is earned directly from sport-hunted elephant (Bond 1994). The remaining 8 percent of total revenue is generated from nonconsumptive tourism leases with the private sector, and the sale of wildlife products. Between 1989 and 1995, 56 percent of the gross income earned by RDCs, or U.S. $4.1 million, was devolved to producer communities living with wildlife. Over the same period, approximately 24 percent was invested in wildlife and related program management, and RDCs have retained about 12 percent in the form of a levy. Approximately 8 percent of the gross income, however, has remained "unallocated" in terms of the CAMPFIRE guidelines. This income has been retained by cash-strapped RDCs, mostly for general expenditures.

The financial benefits derived from wildlife are central to CAMPFIRE. The devolution of these benefits to communities living with wildlife is intended to stimulate both collective and individual resource management, thereby providing rural communities with an alternative or complimentary land use to agro-pastoralism. For most districts, however, the benefit at household level has been low compared with other gross agricultural income. In each year between 1989 and 1993, the modal class of the wildlife benefit (from 265 ward level dividends paid by district councils) relative to an index of gross agricultural production was less than 20 percent (Bond 1999).

The fugitive nature of wildlife and the multiple stakeholders involved in its use suggest that a participatory and joint or co-management approach is necessary. In the early development of CAMPFIRE the role of the producer communities was restricted to that of passive recipients of wildlife revenue: the Central Government, through its management authority, the Department of National Parks and Wild Life Management (DNP&WLM), set and allocated sport hunting quotas; the private sector leased the use (tourism and sport hunting) rights from RDCs, and the

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district councils, empowered by Appropriate Authority and other natural resource legislation, controlled the financial benefits from wildlife.

Under such conditions, wildlife utilization as a long-term sustainable land use option was considered unlikely unless two important changes were implemented. First, a stronger and more clearly defined enabling environment for the use of wildlife was required; second, technologies had to be developed to allow community wildlife producers to maximize their role in a wider management framework. Consequently, in 1992, it was proposed by the CAMPFIRE Collaborative Group (CCG), a consortium of implementing Government and NGO agencies, that Appropriate Authority be devolved from district to ward level. This was aimed at strengthening the enabling environment and providing incentives for the development of common property management regimes for wildlife and wild land. The fact that this has yet to be achieved will be discussed later.

Participatory Technology Development

Concurrently, the World Wide Fund for Nature (WWF), through its Support to CAMPFIRE Project, was given the responsibility of developing appropriate methodologies to allow wildlife producer communities at ward level to participate more fully in wildlife management activities and thus optimize their role in a wider decisionmaking framework. Such changes would provide incentives for the development of common property management regimes, collective and individual, for wildlife and wild land. Participatory technology development (PTD) (Sutherland and others 1998) brings together technical specialists (in this case ecologists or biologists) and local communities (represented by Ward Wildlife Management Committee (WWMC) members) to design, implement, test, monitor, and refine local management activities. This process must recognize at the outset that the methodology developed should be technically acceptable and socially possible. Such an approach, together with scholarship, can play an important interpretive, translative, and facilitative role in articulating the needs and views of local managers (Murphree 1997).

The CAMPFIRE Project has been working with selected rural communities from five wards comprising three districts in the Zambezi valley of Zimbabwe. This case study considers four areas of participatory technology development undertaken by the Project, namely land use planning, wildlife census, quota setting, and financial management. Underpinning the development of these methodologies has been their use as tools with which to involve local communities as active participants, rather than passive recipients, in natural resource management.

The Reform Process

Land Use Planning

In Zimbabwe, land use planning has been product driven, technically oriented and executed by outside specialists. Consequently, local communities have viewed such planning negatively and with mistrust leading to nonacceptance and failure at both macro- (regional) and micro- (local) levels. As an important part of resource management, CAMPFIRE has recognized that (1) planning is a dynamic process and that the product is not necessarily a static blue print; (2) a land use plan is a means to an end and not the end itself; (3) the end must be defined by communities themselves; and (4) the end should reflect a vision of community goals and aspirations to which land use planning can contribute. The project has worked to develop participatory land use planning processes that will be responsive to internal and external social, ecological, and economic conditions. These processes should reflect iterative and ongoing adjustments to these conditions such that human demands on the environment do not exceed the supply of goods and services from that environment. Although the project has focused on wildlife-related land use planning, it recognized that the project areas also suffered from a lack of good agricultural land use planning. Where it was possible or necessary, these broader issues of land use planning were addressed in facilitated problem analyses. Participatory resource surveys (fig. 1, 2), inventories, and mapping have been an integral part of the planning process and contributed to identifying key land use constraints.

Wildlife Census

Aerial surveys, generally effective for large dark-bodied mammals only, such as elephant, buffalo and sable antelope, conventionally provide the primary index of wildlife abundance (Taylor and Mackie 1997) (fig. 3). These surveys are technologically sophisticated, expensive, and remote from wildlife producer communities. Moreover, recent aerial surveys in support of the CAMPFIRE program have all been undertaken with donor support. The development of locally executed, ground-based census methods not only provides another comparative index of animal abundance, but is a necessary condition for the establishment of common property management regimes. Different participatory approaches to ground-based census methods have been developed with producer communities in the project areas and include annual ground census, "random walk" and fixed transect counts.

Undertaken by community members themselves, these approaches reflect local perspectives and adaptations to site-specific requirements and conditions, rather than the development of a standard methodology. Nevertheless, they all endeavor to incorporate principles of rigor, standardization, and repeatability. Because measurement of distance, commonly used in ground census methods (Buckland and others 1993) has proved difficult to apply, at least initially, time has provided an important substitute for the unit of measurement in the methods used (Marks 1994). Participants either analyze records immediately following the census (in the case of annual counts) or quarterly for those counts undertaken monthly or more frequently. Counts over the past four years have yielded consistent results providing usable indices of abundance and trends for those large mammal species important to management (Taylor, in press). These results are now being used, together with other trend indices, by community and district officials to establish quotas for trophy hunting (fig. 4).

Figure 1—Game guards and resource managers undertaking resource surveys in the field as a part of land use planning.

Figure 2—Classroom session with community representatives on land use planning.

Figure 3—Participants at a wildlife management workshop playing the aerial survey simulation game.

Figure 4—Developing skills in electrified game fence maintenance, necessary when zoning for wildlife use.

Quota Setting

Conventionally, quotas for wildlife harvests have been established by a central wildlife management authority based on surveys by biologists who are separate from managers and users of the resource. Typically, surveys are spatially and temporally inadequate and focus on quantitative, but often highly variable, data about which there is little or no discussion with the end users of the quotas. Development of a participatory quota setting methodology (Taylor, in press), commencing at the producer community level, brings together all the key stakeholders involved in the quota setting process, recognizing the importance of data, information, and knowledge each can offer to a co-management framework. Thus aerial census data, participatory ground counting results, and trophy quality measurements, together with the local warden's opinions, safari operator's "catch effort" and community perceptions provide a set of indices that are triangulated and combined in a matrix used to adapt the previous season's quota. Crucially, information and data are collated and analyzed in a highly visual, interactive manner at a facilitated quota setting workshop (fig. 5), thereby allowing full participation by all stakeholders. Built into the workshop methodology is a training component based on a series of participatory exercises. These inform producer community representatives, allowing them to actively participate in the quota setting process. The quotas thus produced are forwarded to the central DNP&WLM authority as a recommendation for approval.

Financial Management

Reviews of the management and use of wildlife revenue at ward level suggested it was inefficient and that there was a low level of accountability to the wider community by those responsible for its management. Given the low financial benefit at household level, this effectively reduced the financial incentive for the conservation and sustainable use of wildlife by the producer wards. Participatory problem analyses identified the lack of financial planning and management skills as the major constraint to more effective use of wildlife revenue. An alternative, participatory training methodology for financial management was investigated and developed. The product was a simulation tool based on the board game "MONOPOLY," placed in context and restyled as the "CAMPFIRE Game." The game creates a medium for financial exchanges by the participants, including buying, selling, and leasing property, developing infrastructure, collecting rents, and other miscellaneous financial transfers. Transactions are recorded and monitored by the participants using a full set of financial documents such as cash and receipt books and asset registers.

At its simplest, the CAMPFIRE Game allows the participants to develop an understanding of record keeping, simple financial procedures, and basic arithmetic. However, the Game can be used interactively to provide training for a full range of bookkeeping and financial skills, including budget development and cost benefit analysis. Importantly, procedure manuals written by office bearers, usually the ward secretary and treasurer, have been used to develop an

Figure 5—Quota setting workshop: participants discussing the triangulation matrix.

"institutional memory" in an environment where there has been a high turnover of personnel. Accountability between the management committees and the wider producer communities was addressed through the use of strategically placed (at schools or stores) and highly visual posters in the form of cash flow maps.

Important Considerations and Lessons Learned

Participatory Technology Development

Key considerations in participatory technology development include:

1. PRA (Participatory Rural Appraisal) and PLA (Participatory Learning and Action)—These are important tools but need to be applied properly (Chambers 1997). As such it is important to recognize their use as a means to an end, and not the end itself.

2. Community participation—Community participation is extremely important, but what does it actually mean? Apart from the problems of defining a community, it is both impractical and unlikely that all members in a given community can or indeed want to participate. In developing CBNRM programs, key individuals, community leaders (both traditional and modern), elected bodies, and other resource management institutions need to be identified as representatives of the larger community with whom to work.

3. Gender—The role of women in using natural resources is traditionally important, especially at the level of household livelihoods. Their role in any larger local decisionmaking framework, however, is largely passive. Consequently, their participation in resource management activities should be actively encouraged.

4. Voluntary participation—Because communities are developing their own capacity in resource management, it is anticipated that they will give their time voluntarily. Nevertheless, it should be recognized that often participants, such as farmers, are themselves busy people and care must be taken to ensure that undue demands are not put on them. Where appropriate, payment for services rendered can be made but any likely or long-term dependency on monetary reward must be avoided. These benefits should eventually flow from community investment in resource management.

5. Working sessions—Depending on the nature of the work being undertaken, work sessions with communities or their representatives should not be unduly long or repetitious. Work should be undertaken at convenient times. As far as possible, avoid undue discomfort or displeasure in the work being undertaken. Workshop-type sessions, which are interactive and participatory, are preferable to classroom-type sessions, which are teacher-pupil oriented, uni-directional, and consequently tend to be top-down.

6. Field work—Resource management takes place where the resources occur, in the field. Field work involving key informants and other community participants is important in developing a number of management methodologies. For example, resource surveys and mapping exercises are best done in the field where local knowledge can contribute meaningfully and where outside specialists themselves can learn.

7. Skills and attitudes—The individual and group skills of a community need to be taken into account as these will influence choices a technical specialist may make between facilitating the development of a simple or complicated solution. For example, a farmer with limited formal training and experience requires a technique that is simple and robust compared to one that relies on highly accurate observation and measurement or requires very complicated technical tools or equipment. Working sessions that are varied, interactive, and relate to the skills of the group will encourage a positive approach, minimize prejudice, and motivate participants.

8. Communication and visualization—Good communication and interpersonal skills are essential. Facilitators must be confident but not outspoken. They must be prepared to listen, hear, and acknowledge what they are being told even if they may disagree. Visualization of an issue is a powerful communication tool and is preferable to the written or even spoken word, especially among rural communities, many of whom are illiterate. Posters, cards, artwork, photographs, picture or comic stories are all very useful techniques. Role plays and theater have been very successfully applied in CBNRM programs in southern Africa.

9. Feedback—Feedback, both between facilitator and community and within the community itself, is extremely important. It is not possible, nor even necessary, to reach all members of a community when facilitating PTD, provided adequate and appropriate feedback is provided. Feedback can be communicated in a number of ways, as described above.

10. Ownership—The development of a participatory methodology in CBNRM implies a nonextractive approach to the method finally developed, the knowledge used to develop it, and the information or data it may subsequently generate. A researcher may use PRA as a tool to acquire his data but the approach is extractive; the researcher takes his data away with him. In facilitating PTD, ownership of the technology is vested in the community. For example, wildlife data collected by village game guards should be stored, collated, analyzed and used locally. Application to improved management by the community, and thereby subsequent benefit, provides the motive or incentive for collecting the information.

11. Continuity and linkages—Invariably in PTD, the technical specialist is remote from the community being worked with, both in time and space. The specialist is usually located at a central base some distance from the community and is able to visit the area only infrequently. This results in communication breakdowns and a lack of continuity in effort, both on the part of specialists and communities. The use of locally based facilitators has proved very successful in overcoming this problem. Such facilitators can be outsiders employed by the project but residing within the community, or a member of the community itself, working under the guidance of both community and the project.

Lessons Learned

Lessons learned from this project include:

1. Institutional development input ideally should precede technical input—The assumption that robust local institutions, dynamic leadership, and social cohesion must be in place in the project areas prior to intervention with participatory technology development does not necessarily hold. With one or more of these essential "institutional" preconditions lacking, there was impact on the rate of development of the methodologies. With hindsight, however, the process of developing participatory technologies with local communities has itself contributed to institutional strengthening. Indeed, without these technologies, the likelihood of robust institutions being in place is questionable. Technological and other reforms may well be the precursor to strong institutions.

2. Optimum size of project area—Our experience has shown that the ability to develop local capacity and the level of acceptance and adoption of the reforms described differed among the project areas and that this can be ascribed, in part, to the size of the target group. The smaller the group, the greater the rate of adoption. Whatever the size of the group or the methodologies in question, we consider the development of an "institutional memory" crucially important once the methodology has been adopted.

3. District support for project implementation—Because Appropriate Authority is vested in the Rural District Council, implementation of ward-level activities requires the good will and support of the political and executive hierarchy at district level. The district should be viewed as a project beneficiary, as well as the target wards. Explicit recognition by the RDC of its role and expectations, especially with respect to support for the co-management framework, is a necessary condition.

4. Enabling local communities to access technical information—Project implementors over-estimate the extent to which rural communities have technical information or access to it. The assumption that this information is available leads to greater transaction costs to both project and community. Local people can learn quickly to develop and apply surveys, to plan, and to budget once they are given the tools to do so.

5. Adoption of technology linked to long-term vision of community—Undertaking participatory resource surveys, drawing up land use plans, and developing solutions are all means to an end. Communities must be aided in defining the "end" that reflects a vision of their future and quality of life goals, the "means." Methodologies and tools provided here are a part of that aid.

6. Participatory techniques are process oriented and not production oriented—We have recognized that the use of participatory techniques in developing or transferring resource management technology requires a "process-oriented" approach rather than a "production-oriented" or "delivery-oriented" approach. This implies that the methodology being developed is more a process of testing and adapting techniques in participation with local communities and certainly not the delivery of blueprints. The objective or end point is clear but the tools are rudimentary and even unwritten to begin with, often vocal and perhaps unclear regarding the method of getting there. It is essential to produce a common understanding of the problem and develop a locally adapted and sustainable solution.

Discussion

Community-based natural resource management in Africa reflects changing paradigms in accomplishment of broader conservation and development objectives (Adams and Hulme 1998; Spinage 1998). Old rules are being replaced by new rules; this is a process described as institutional change. Such change in programs like CAMPFIRE is enhanced primarily by two factors: net economic benefit from natural resources, and strength of proprietorship over these resources. Either increasing economic benefits or strengthening proprietorship, or both, can lead to institutional change. Both benefits and proprietorship have remained relatively weak in CAMPFIRE during the time that these technological reforms have been developed. There has been no change in the status quo of the enabling environment, and the benefit at household level remains low compared with other gross agricultural income. As yet, Central Government has not devolved authority to ward level. Had this occurred, we believe there would have been a more rapid rate of adoption of the reforms described. Nevertheless, through participatory technology development, an innovative start to producing the tools necessary and appropriate for the needs of community-based resource management has been made. Such tools not only allow communities to maximize their roles within the given set of rules pertaining at the time, they also allow those rules to be challenged. Under such conditions necessary institutional change may be more likely.

The approach and methodologies described have been developed and implemented over the past 3 to 5 years. Testing the methodologies has been possible so far within a relatively short timeframe only. Their longer term application and success remains to be seen, but the project is developing monitoring systems to be implemented by producer communities themselves. Nevertheless, there has been popular support in the project areas for the methodologies that have been developed and used. Their adoption and use is facilitated through locally employed members of the community who are responsible to both the ward committees and WWF project implementors. Importantly, the methodologies are viewed as locally "owned" and which outsiders (project implementors) do not have proprietorship over. For example, data gathered during censuses undertaken by village game guards are stored and analyzed locally, and any effort to extract information or knowledge by project implementors has been carefully guarded against. A set of 12 practically oriented wildlife management manuals are presently being produced that will provide easy-to-follow guidelines for local use. This will also allow wider dissemination in CAMPFIRE beyond the pilot project areas.

The need for integration or co-management of resources has been strengthened through these methodologies. Although often politically sensitive, land use planning is

increasingly being viewed at both ward and district level as important for sound resource management. The broader district perspective still needs to be harmonized with ward and village needs and aspirations. The census and quota setting methodologies, together with the innovative approach to financial management, perhaps best captures the linkages between resource assessment, use, and subsequent benefit and the framework necessary for implementing sustainable and resilient resource management. Because these methodologies link directly to management, it is expected these reforms will be of lasting value and provide an important platform for sustainable natural resource use, biodiversity conservation, and institutional change.

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Wilderness Research in Finland: Examples of Ecological and Social Studies

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Abstract—The goal of the Finnish Wilderness Research Program (1993 to 1996) was to produce scientific knowledge to serve as a basis for the sustainable use and management of wilderness areas in Finland. A multi-disciplinary approach to wilderness issues characterized the program. Results from the three major contributing fields of research are presented in this paper. At present, research focusing on wilderness continues in the form of individual projects. The network of wilderness researchers is coordinated by the Finnish Forest Research Institute, Rovaniemi Research Station.

Statutory wilderness protection is fairly young in Finland. Besides the 12 wilderness areas currently designated through legislation, there are numerous other areas considered to be wild in Finland. The image of wilderness lies deep in the minds and culture of the Finnish people. Wilderness tradition and related images have their origin in the Middle Ages, when wide tracts of backcountry areas in Finland were accessed by hunters and fishermen (Hallikainen 1998). These areas served as backyard storehouses.

The Finnish Wilderness Concept and Experience

The Finnish wilderness concept and the characteristics of wilderness landscapes have been studied by means of questionnaires and landscape-ranking studies conducted among the Finnish population (Hallikainen 1998). The studies found that virgin forests and open mires (wetlands) are the foremost features of Finnish wilderness. Especially old and gloomy, spruce-dominated forest landscapes are important for the wilderness experience. Additionally, Finnish wilderness has to be fairly vast, roadless, uninhabited or at least nearly so, and remote. Although certain outdoor constructions, and even very slight forest cuttings, may be allowed, the areas have to be close to their pristine condition (Hallikainen 1998).

Wilderness is a well-known concept among Finnish people; about half of the population have visited areas they regard to be wilderness. Most of the visits have been rather brief, lasting only a day or a weekend.

Old traditions can be seen in wilderness activities. Hunting and fishing, as well as picking wild berries and mushrooms, are the most important wilderness activities in Finland. Other motives, however, such as experiencing peace and solitude are more important to the majority of modern-day hunters, fishermen, or berry pickers than the old motives such as collecting game and fish (Hallikainen 1998).

The Effects of Logging on Biodiversity of Birds, Beetles, and Fungi in Wilderness Forests Near the Timberline in Finnish Lapland

The effects of seed-tree cutting on birds, fungi, and beetles were studied in pine forests in the Hammastunturi Wilderness Area and its surroundings. The results thus far can be summarized as:

1. The total pair number of birds, as well as the number of hole-nesters, and species confined to old-growth forests diminished in the logging areas compared with unlogged control plots. The pair numbers of open habitats species and migratory species increased, while those of sedentary birds decreased (Jokimäki and Inkeröinen 1995).

2. The total yield of macrofungi decreased in the logged sites, especially the number of mycorrhizal fungi (Paulus and others 1995).

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3. Wood-rotting fungi were studied at logging sites up to 40 years old. Only half of the original number of old-growth forest species were found among the logging waste on the oldest logging sites. However, residual logs from before logging activity still hosted the majority of the pristine forest species. Endangered species demonstrated different degrees of ecological tolerance to logging: some survived in the residual logs, some had disappeared, and some were able to invade the logging waste (Sippola and Renvall 1998).

4. The total number of beetles increased immediately after logging, especially the number of cambiovores and open-habitat species. On 15 year old logging sites, the species composition of general species had changed considerably. Also, the number of rare species diminished in the course of time (Sippola and Kallio 1995).

The effects of logging are very much dependent on the methods applied and the intensity of treatments. Important structural elements such as number and diameter of living and dead trees retained on the sites, and the size and frequency of logging treatments, are crucial in determining the effects of logging.

Social Carrying Capacity and the Development of Recreation in Wilderness Environment

As national park and wilderness managers are preparing to deal with increasing numbers of recreationists and tourists in their areas, knowledge is needed about how visitors respond to encountering other people in various places within the parks and wilderness areas. During the summer of 1992, backpackers were interviewed in the Urho Kekkonen National Park in northeastern Finland (Saarinen 1998). Response to encounters with other visitors is dependent on whether the encounter is in the wilderness or in front-country zones, the size of the group encountered, and whether the group encountered is composed of foreigners or Finns.

A majority (nearly 80 percent) expressed preference for some level of contact with others in the wilderness zones of the National Park. Backpackers were more active in initiating social interaction in wilderness zones, where the pressures of recreational use and the numbers of encounters are lower, than in the nonwilderness zone. Attitudes toward contacts with individual backpackers (the majority of those interviewed considered it pleasant) and small and large groups (large groups were less pleasant) were as expected. The different reactions to domestic and foreign backpackers are more difficult to interpret. In general, interaction with foreign visitors is less often rated as pleasant. Contacts between backpacker groups of up to three people are seldom unpleasant experiences. Generally, the normative call for greetings and interaction presumes a common language. Owing to language barriers, it is more difficult to establish warm social contacts or any contact at all with foreign visitors (Saarinen 1998).

The attitudes shown toward different user groups were found to depend on traditions and expectations concerning social interaction. A majority of visitors indicated that interaction with other backpackers is generally a pleasurable experience, but certain cultural customs apply. Factors such as tradition (culture) and interaction are not independent; the tradition generally regulates social interaction, and interaction causes and strengthens tradition and norms. In the future, it would be desirable to develop greater understanding of social meanings, the role of interaction and language, and their relationship to the establishing and manifestation of social norms. This suggests the need for a more qualitative approach. Social carrying capacity, as well as many other capacity judgments, may be greatly dependent on the cultural context of the judgments, how people relate to specific places, and what values and meanings those places reveal to them (Saarinen 1998).

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Global Voices, Village Choices: Fire Management Strategies for People and Wildlife in Wyanad, Kerala, India

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Abstract—Global interest in wilderness and wildlife issues is a phenomenon of today's world. The interest generated by people, agencies, and organizations to perpetuate sustainable habitats in wilderness and other wildlands has done much to conserve vanishing resources. Project Tiger in India is one such example. Biologists and policy makers within India and elsewhere have joined forces to reverse the alarming downward trend in numbers of the Bengal tiger on the sub-continent.

The pressures of people and environmental factors often adversely impact natural resources. This fact is especially true in India where approximately 200,000 villages containing 250 million people are located within or near the 72 million hectares of India's forests. This statistic is similar to placing the entire population of the United States within the comparably sized National Forest System in that country! Villagers in India use wildland fire during the dry season for many beneficial purposes, often without provisions for controlling the extent of these fires. Initiating joint fire management practices is essential to the welfare of people and natural resources.

The Kerala Forestry Project, sponsored by the World Bank, is unique because it brings newly developed forest sector reforms to the forests of the Western Ghats in southern India. This paper highlights the Fire Protection Strategy for the forest resources of Kerala as one phase of the overall Project because wildfires are debilitating even to the forests of tropical Kerala. Although a statewide strategy for fire protection was developed during the 1996 to 1998 period, the focus here will be primarily on issues and recommendations for the Wyanad Wildlife Sanctuary, a 344 km^2 reserve of forests. Wyanad also is home to 1,338 Tribal and 1,068 non-Tribal families.

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The Setting

Strategic Significance of Wyanad Wildlife Sanctuary

The Wyanad Wildlife Sanctuary covers 334 km^2 of forests and is contiguous with the Protected Area network in the Western Ghat Mountains in southern India called the Nilgiris. The Nilgiris is comprised of the Nagarhole and Bandipur National Parks in Karnataka, and Mudumalai National Park in Tamil Nadu. The Wyanad Wildlife Sanctuary is joined to the western part of the recently formed Nilgiri Biosphere Reserve, and is also a part of "Project Elephant" launched recently by the Central Government for the in situ conservation of the largest of Indian mammals and its precarious habitat. Being wetter than both Nagarhole and Mudumalai, Wyanad Wildlife Sanctuary is home to many migratory herbivores from the two sanctuaries when forage is scarce. It also is part of the catchment of two major rivers: Kavari and Baavali.

Area and Land Use

One-third of the original wilderness area (about 110 km^2) was planted with teak and several other species. About 150 human settlements are located in the Sanctuary. Wyanad receives a large number of visitors during the nonrainy season for recreation and ecological education.

The Wyanad Wildlife Sanctuary has over 34,443 hectares of forests organized into four "ranges," or districts. It is managed by a Warden with the rank of Deputy Conservator of Forests; the Warden is assisted by four Range Officers.

Climate

Temperatures in the Sanctuary vary from 13 to 32 ^oC. Rainfall totals about 2,000 mm and is associated with the southwest monsoon, which starts in June and ends with the northeast monsoon in December. The most important precipitation, from a fire management perspective, occurs in April and May. Although the amount is small at this time of year, it is effective in dampening the wildfires that are at their peak. Humidity also increases at that time of year, impeding new ignitions during the remainder of the fire season. Thus, the fire season is generally confined to the January-March period when it is hot and dry. The climate, vegetation, and presence of numerous perennial water bodies are all factors that might have combined to make fire a nonissue in Wyanad. But the people found in the 150

settlements and enclosures have legitimate needs that conflict with sanctuary management objectives.

Regeneration and Plantations

Regeneration of important endemic species is rather sparse, presumably due to annual surface fires. This is characterized by the open and thin crop of the younger and middle age classes; and the replacement of semievergreen species with fire-hardy ones.

About one-third of the Sanctuary, or 11,500 hectares, is covered by plantations. Teak plantations are found on 7,554 hectares. Eucalyptus plantations (1,526 hectares) are now reverting back to a more natural character as required by new policy.

Although wild animals may be sighted on the plantations, there is not suitable forage. This is especially true for elephants, which comprise the main wildlife value in the Sanctuary.

Wildlife, Wildfire, and the Social Environment

Animals

The Sanctuary abounds in animal life as diverse as its plant life. Hundreds of species of animals and birds, and dozens of species of reptiles, fish, and amphibians live in Wyanad, attracting many tourists. A Census of some of the animal species is conducted every 3 to 4 years. The results of the last four counts are found in table 1.

Settlements and Enclosures

The Sanctuary is home to 1,338 Tribal and 1,068 non-Tribal families that are distributed among four different ranges (table 2).

Competition for habitat between human dwellers and animals on the one hand, and the increasing interest in tourism on the other, have combined to produce both threats and opportunities for fire management planning. Additionally, cattle and goats maintained by the inhabitants of the settlements and enclosures compete for food and space with the wild animals (table 3).

Some of the activities in the Sanctuary that carry a high fire risk include: grass production, collection of medicinal and other forest products, "masking" of illicitly cut stumps of trees, improving visibility for hunting, illicit production of alcohol in cover provided by forests, and operational forestry work during the dry season.

Table 1—Wildlife (mammal) numbers, 1989 to 1996, in the Wyanad Wildlife Sanctuary.

Animal	1989	1990	1993	1996
Lion tailed macaque	—	—	1	—
Bonnet macaque	25	382	336	—
Common langur	41	427	155	605
Elephant	858	343	127	761
Guar	780	216	45	500
Sambar	756	223	194	679
Chital, or spotted deer	965	608	488	1,286
Barking deer	219	116	25	174
Mouse deer	—	12	11	109
Wild boar	48	90	57	110
Malabar giant squirrel	206	122	216	775
Tiger	12	—	—	—
Wild dog	14	—	—	—
Bear	4	3	—	—

Table 2—Distribution of Tribal and non-Tribal families among four ranges in the Wyanad Wildlife Sanctuary.

Range	Tribal families	Non-Tribal families	Population
Sultan Baterry	520	136	3,137
Kurichiat	517	724	5,890
Muthanga	269	135	1,655
Tholpetty	32	73	1,064
Total	1,338	1,068	11,746

Tourism and Economic Pressures

According to the 1991 census, the population of Tribals within the forests is 4,230. Additional people are attracted to Wayanad because of its importance as a center of the "hill produce" trade. Also, there is tourist pressure from the States of Kerala, Karnataka, and Tamil Nadu, which is high throughout the nonmonsoon season.

In the absence of a "buffer" zone around the settlements and enclosures, or around the core wildlife areas, the Sanctuary is frequently in the news regarding losses of life, crops, and dwellings due to elephants. The boundaries of settlements, enclosures, and villages should be the primary focus of planning efforts to help resolve some of the conflicts that exist between people and natural resources.

Because of a high density of people living in the forest, conflict between people and wildlife is the highest in Kerala. Elephant raids on crops around settlements are common, and attacks on people and dwellings are increasing. Use of excessive force resulting in the death of elephants is being justified on the grounds of self-defense.

Table 3— Cattle and goats maintained in settlements and enclosures of the Wyanad Wildlife Sanctuary.

Range	Cattle	Goats
Sultan Battery	1,020	859
Muthanga	441	132
Kurichiat	1,536	370
Tholpetty	106	140

Sanctuary Management Objectives

Management Plan

The Management Plan for the Sanctuary, in force from 1990 to 1999, specifies several objectives: Conserve endangered, threatened, and rare species of plants and animals; manage plantations to restore them back to a natural condition; minimize conflicts between humans and wildlife; develop tourism and provide resources to Tribals; and assist the development of nearby communities.

Kerala Forest Policy

The Sanctuary's management objectives are supported by the Forest Policy promulgated by the State Government in 1987:

- All Sanctuaries and National Parks should be rigidly protected from fire by providing watchtowers and firefighting units with sufficient staff and equipment in fire-prone areas.
- Grazing should be completely prohibited in the Sanctuaries and restricted in the forests adjacent to them.
- Greater participation by Tribal communities in afforestation and reforestation programs should be developed through training, encouragement, and a share in the proceeds of timber harvest.
- The provisions of the Wildlife Protection Act should not be implemented in a way that alienates Tribal interests. Care should be taken to protect Tribal people and property from wildlife, and to protect the wildlife from people.

Fire Management

Statistics on areas burned and losses suffered are very incomplete and unreliable, making it difficult to ascertain the true nature of the fire problem in the Wyanad Wildlife Sanctuary. In some ranges, for example, only a few fires are reported for the 5-year period from 1991 to 1996. No recorded information is available on the cause of fires, but it is believed that most wildfires start due to: escapes from fires started by Tribals for the collection of nontimber forest products such as honey, fruits, and nuts; escapes from fires lit to scare wildlife that is straying into the settlements; fires lit by cattle owners to produce better fodder; escapes from torches carried by forest travelers; carelessness of tourists; and arson to spite the staff or destroy the evidence of trees stolen by poachers. Most fires appear to start along roadsides and in the vicinity of settlements and enclosures. Because all of the wildfires are started by people, there is an excellent opportunity to bring villagers and foresters together to develop conservation strategies that would be mutually beneficial.

A system of preconstructed firelines has been in place for a long time based on Management Plan prescriptions. This network provides access and strategic locations for wildfire suppression operations. The main weakness of the firebreak system is that it is incomplete and does not protect many vulnerable areas of the Sanctuary. The firelines are burned prior to the fire season to eliminate flammable vegetation, and seasonal firefighters are hired for suppression work. The length of the fireline network is about 800 km, and half of this total is comprised of forest roads. Reduced funding has greatly restricted the amount of fireline maintenance work in recent years.

Values and Fire Management Objectives

Values at Risk

Impact of Fire on Habitat—Elephants, guar (bison), sambar, and spotted deer are the main species requiring most of the fodder in the Sanctuary. Large numbers of elephants and guar migrate into Wyanad every summer, adding to the pressure on vegetation. Fodder availability has been declining due to several factors. Although fire may rejuvenate fodder in grassland areas, it appears to degrade undergrowth, bamboo, and flora on the floor of plantations.

Crop-raiding by elephants and the cycle of vengeance it sets up as people and elephants kill each other is apparently the result of a shrinking fodder resource. Large fires need to be excluded, while smaller prescribed fires might be used to further objectives for habitat restoration and human benefits.

Impact of Fire on the Forest—Of the nearly 34,000 hectares of forest, about one-third is plantation, and the remainder is moist deciduous forest. Large wildfires in these types degrade vegetation, cause soil erosion, reduce biodiversity values, and eliminate cover for wildlife.

Impact of Fire on Tourism—There are two designated tourist zones in the Sanctuary, one in Muthanga and the other in Tholpetty. The amount of tourism is increasing each year and the tourist season overlaps with the fire season. The best tourist experience in this area is one of seeing wildlife in a natural setting. Smoke from fires can impair this experience both visually and qualitatively. Conversely, it has been observed that dense vegetation resulting from fire exclusion may reduce opportunities for wildlife to be highly visible. At the Periyar Tiger Reserve further south in Kerala the staff reported that wildlife often congregates on recently burned areas, providing enhanced opportunities for viewing.

Main Issues in Fire Management

Policy Constraints

Kerala Forest Policy does not envisage any role or relationship with the local people for fire protection. It regards people as external to the entire problem and ignores the reality that the villagers share the same habitat with the wildlife. By excluding positive interactions with the villagers, the Policy may actually serve to strengthen mutually hostile attitudes between the staff and the villagers.

Another weakness is the fact that the Policy treats all fires as bad for the forest and they must be fought. Policy does not differentiate between wildfires and prescribed fires, and does not regard systematic fire management as part of the overall conservation strategy for the forests or for the Sanctuary.

The grazing policy, which grants unrestricted right of entry to local cattle into the forest, is a major cause of wildfires. Public policy does not recognize or provide for the involvement of people, the media, and educational institutions in building awareness against wildfires.

Strategic Issues

The custom of the Kerala Forestry Department, like elsewhere in India, has been to make fire more a matter of disciplinary fear among the staff than one of planning and management. As a result, only a fraction of the fires that occur are reported, and only a fraction of the losses are reported. Even the reported fires are usually of "unknown" origin. Fear of this nature is bound to impede the flow of reliable information vital for management planning and public awareness. It is essential to know such things as the location of fire, time of fire, size, weather, fire behavior, fire effects, and costs. This deeply ingrained agency culture also limits Department programs in many other ways.

Recommendations

Following an in-depth review of the fire management situation at the Wyanad Wildlife Sanctuary, these recommendations were developed for consideration by the Kerala Forestry Department:

- The Wildlife Warden at Wyanad should hold fire management meetings in each Range ahead of the fire season to share the planning and budgeting process with Range Officers and Foresters. An important part of these meetings will be to assign responsibilities to carry out such functions as map and plan preparations, fire detection, accurate fire reporting, extension and publicity campaigns, and enlisting the support of local villagers in fire suppression and prescribed fire.
- The Wildlife Warden should also inspect the inventory of tools, equipment, communication network, and vehicles to verify that all components are in readiness for the fire season. He will also determine the readiness of the watch towers and operators. Firefighting assets from other divisions and agencies need to be committed for the duration of the peak fire season.
- Meetings should be held with people from the respective settlements, enclosures, and villages to enlist participation in the fire management program for prevention, suppression, and use of fire.
- Honorary Fire Wardens should be appointed in each settlement, enclosure, and village to provide community leadership in the development of participatory fire management programs.
- At least one Fire Prevention Day should be scheduled early in the fire season in each of the fire-prone ranges to heighten awareness for the need to be careful with fire.
- The Wildlife Warden, Range Officers, and Fire Management Officers need to maintain active contacts with all stakeholders during the fire season to ensure compliance with the Fire Management Plan.
- The Kerala Forestry Department should design and adopt a fire prevention symbol to help people associate with the concept of forest conservation and fire protection.
- The Kerala Forestry Department needs to provide local training for staff in each Range in fire weather, fire behavior, fire suppression tactics, and fire safety. The training center at Arippa might be used to "train the trainers," who would then return to local areas to train range staff and villagers in the basic skills required in fire management.

Conclusions

No matter how valuable global, national, or state programs may be, ultimately the people who live and work in the affected areas must become involved in conservation choices and strategies at the village level. Joint forest management examples elsewhere in India—cooperative efforts between the Indian Forest Service and local villages — have demonstrated on numerous occasions that it is better to develop partnerships with local people rather than to exclude them or relocate them.

In other words, concerned global voices need to be augmented by informed village choices if conservation measures are to succeed in the long run. A similar strategy involving local people can be developed in the Wyanad Wildlife Sanctuary to ensure that natural resources are conserved while at the same time providing for the well being of local people.

Globalizing Wilderness: A Perspective on Traditional Ecological Knowledge in an Interconnected World

Paul Faulstich

Abstract—This paper examines "Western" environmentalism and its application to international and intercultural contexts. The application of Western ecological models to non-Western societies and ecosystems must consider indigenous peoples as vital players in conservation efforts. Indigenous practices inform ecologists of the likely effects of alternative management strategies and consequential meaning in today's interconnected world. A viable future for environmentalism lies in the revitalization and incorporation of some of the traditional ecological knowledge of indigenous peoples. This paper draws on recent field research in Australia and Nepal, with implications for designation and management of protected areas.

The task of environmentalism—defending the wild—benefits by support from, and of, indigenous peoples. In our contemporary and increasingly interconnected world, autonomous conservation efforts of indigenous peoples offer environmental inspiration and insight of global importance. New alliances between conservationists and indigenous peoples hold additional promise of promoting environmental goals and cultural survival in the global political sphere. The development of partnerships reflecting new cooperative strategies linking indigenous peoples and nonindigenous environmentalists is leading to more effective and equitable conservation efforts in places as distant and different as Australia, Papua New Guinea, Nepal, Honduras, and Zimbabwe.

International environmentalists, together with a growing number of indigenous groups, are affirming the value of new intercultural alliances. Increasing global awareness of the need to protect Earth's diminishing biological richness has focused greater attention on indigenous peoples for a couple of important reasons: their homelands are increasingly understood as places worthy of protected status, and their knowledge of these areas is unique and unparalleled.

This paper examines the pitfalls and promises of environmentalism applied in an international and intercultural context. By deconstructing old ways of practicing environmentalism while simultaneously reconstructing new ways, we can begin to build a new environmentalism for an interconnected world—one predicated on intercultural cooperation, ecological integrity, and cultural sensitivity. Indigenous ecological strategies are key in this reconstruction; they inform Western ecologists of effective management strategies that have consequential meaning, and they represent a way of empowering native peoples whose knowledge and insights are essential to informed land use and conservation.

Human existence is, arguably, being degraded in some ways by our headlong rush toward globalization. Global consumerism, economic oppression, cultural homogeneity, and widespread environmental degradation are among the negative consequences of globalization. This is not to suggest that globalization per se is inherently wrong, just that it is inherently dangerous, and that most of the ways we have approached it thus far have been dysfunctional. In this paper, I call for a rethinking of the ways in which we "do" environmentalism and globalization.

My intent in this paper, despite my concerns, is not to offer a comprehensive critique of globalization, but to assess its promises and pitfalls in relationship to indigenous peoples and environmental concerns. I do not ask to abandon our penchant for globalization; the reality of it is unavoidable. Its manifestations, though, remain malleable and contestable. What I argue for is a globalization informed by local knowledge and tempered by respect for cultural diversity. Local knowledge is increasingly scarce and largely the intellectual property of indigenous peoples.

The ways in which globalization interfaces with indigenous peoples are cause for both alarm and hope. Critical alarm arises from the legacy of devastation that globalization has thus far left on native cultures and ecosystems. Hope lies in the realization that indigenous peoples around the world are reasserting their cultures, and that many have maintained (and in some cases increased) biological diversity in their homelands.

With their considerable knowledge, experience, and commitment to preservation, indigenous peoples can be cogent partners with environmentalists in conservation efforts. Conservationists are increasingly appreciating indigenous people's ecological knowledge, resourcefulness, and achievements, and are becoming more sensitive to human rights and sovereignty issues raised by conservation practices (such as the establishment of national parks). These developments have led to international concern over indigenous people's futures, and an increased understanding of the value of learning from them and working in partnership with them (Stevens 1997a).

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Globalization and Epistemology

Human interaction with the environment is widely viewed as the source of ecological problems, and increasingly understood as the key to their solutions. In an increasingly globalized world, such human interaction is necessarily transcultural, presenting both a challenge and an opportunity. The environmentalist's mantra, "think globally, act locally," surely does contain some proletariat wisdom, but its popular application has more often than not been to justify exploitation. As one social scientist has noted ironically, "'Acting locally' while 'thinking globally' means surfing in Maui while thinking about the next business deal in Manila" (Luke 1993).

Technological advances add justification to the new global form of excessively abstract thinking. The trend is that through globalization we are gaining information while losing regional knowledge. Cyberspace, for example, is placeless. It advances a kind of information rooted in the abstraction of technological extent, not in the specificity of a biocultural region. In the epistemology of cyberspace, nothing "belongs" anywhere. The very blending of ideas with place, however, contributes immeasurably to our humanity; as social animals, there is no clear separation between who we are and where we are. Human interactions with nature take "place" through the medium of culture. When place is extinguished as a compelling concept, humans suffer tremendous loss. The elimination of place and the worldwide homogenization of diverse local peoples necessarily depletes human epistemologies.

Traditional Ecological Knowledge

One hope for a renewed environmentalism is ethnoecology—the study of cultural ecological knowledge. It encompasses the investigation of ecological priorities and concepts of various peoples, from "first nation" gatherers and hunters to "first world" scientists. Ethnoecology acknowledges that many indigenous practices of land use and resource management are not only adapted to local ecosystems, but often have shaped those ecosystems in ways that have made them more diverse and stable.

Contrary to popular notions, indigenous peoples traditionally and significantly manipulate natural resources. Many indigenous peoples engage in a practice of participation and reciprocity with the land. Warlpiri Aborigines of Central Australia, for example, employ sophisticated use of fire in keeping their country rich and productive. During the winter, when the land is cool and fire is more readily controlled and utilized, Warlpiri light fire to selected grassland areas (fig. 1). Such controlled burning is one strategy that enables Warlpiri to maintain a greater variety of habitats and corresponding stages of production than occur under unaltered conditions. Thus, Warlpiri manage a greater diversity and productivity of plants and animals. At the same time, controlled burns reduce the frequency and intensity of summer bushfires that are characteristic of overprotected areas. Warlpiri consider it their obligation to "clean up the country," as they say, by lighting fires; overgrown habitats are susceptible to conflagrations and are considered to be "dirty" and neglected.

Figure 1—Late season Aboriginal burning in Kakadu National Park, Australia.

While burning the country is an adaptive strategy of environmental management, Warlpiri articulate that they do it as part of their obligation in the maintenance of the mythological realm known as "The Dreaming." Theirs is a moral ecology, predicated on the shared responsibility between people and land. In most indigenous cosmologies, including the Warlpiri's, the human and nonhuman are interdependent, and ecological limits, restraints, and responsibilities are readily apparent and cannot be externalized. The norm is that indigenous cultural ecologies are based on beliefs in the intrinsic value of the land and all that it contains. Romanticized notions of traditional ecological knowledge, however, will help neither the people themselves nor the lands they inhabit, and a realistic assessment of environmental knowledge is essential for effective conservation.

Traditional ecological knowledge and indigenous resource management offer hope for collaborative problem solving in the global arena. The challenge of community-based conservation, though, is formidable, not simply because of the scale of our global political arena, but also because of the nature of the Western environmental movement. By stepping into indigenous territories, environmentalists abandon their accepted and familiar world of wilderness advocacy and enter a realm shunned by some ecologists as too humanized to merit serious attention.

More often than not, local people are considered part of the problem, not part of the solution. Despite widespread evidence that conservation projects are most successful when they incorporate cultural values and traditional institutions, and address locally identified goals, the perception of indigenous peoples as "primitive polluters" persists. Since environmentalists often regard human-modified landscapes disdainfully as aberrations, the conceptual switch to accept such landscapes as essential must convincingly be articulated by those proposing reconceptualization of the human as a component of the "natural" (Western and others 1994).

In our global world, this articulation has increasingly become a focus of collaboration among indigenous peoples, environmentalists, and cultural anthropologists who recognize the efficacy of shared objectives.

Indigenous perceptions of nature enrich environmentalism by providing regional specificity to global issues. Likewise, environmentalism can benefit indigenous peoples by helping them gain greater political and economic control over their lands. Indigenous ecological understandings can translate into resource management practices, including such activities as performing ceremonies to ensure the well-being of the land, enacting restrictions to ease the strain of resource exploitation, prescribing burns to "clean up the country," and regulating access to environmental resources. The critical role of ethnoecology in conservation management has tremendous potential, and has gradually been winning the approval of nonindigenous policymakers, activists, and scholars.

Conservation biologists are increasingly recognizing the contributions of traditional management practices, not only in the maintenance of ecosystems, but also in their restoration. Australian Aboriginal use of fire in maintaining viable populations of rufus hare-wallaby, for instance, is a well-documented example of traditional resource management that has proved effective. The rufus hare-wallaby of the spinifex areas of central Australia became nearly extinct after cessation of traditional fire management techniques (Bolton and Latz 1978).

The immediate, uncritical application of traditional practices, however, is not necessarily the best environmental solution to local problems. In some extreme cases the retention of traditional ecological practices may be maladaptive, while in other cases a phase-in period may be required in areas where traditional resource management has ceased.

Tremendous environmental information remains embodied in the minds and cultures of indigenous peoples inhabiting various regions of Earth. While traditional ecological knowledge is rooted in the past, it remains particularly relevant to today's conservation efforts. Likewise, indigenous ecological knowledge can enhance local autonomy through the continuation of traditional management strategies, the development of new projects, and the application of these strategies and projects to arising land and management issues. These kinds of approaches benefit indigenous communities by boosting levels of sovereignty and allowing the people themselves to direct cultural change.

Indigenous Resource Management

Indigenous peoples' ecological knowledge, conservation and management practices, land use customs, and defense of their homelands have enabled many of them to maintain their territories with rich biodiversity. The pattern is that where indigenous peoples are living on their traditional lands, comparatively healthy ecosystems and biologically rich environments remain. The lesson here is obvious: native peoples have performed remarkably better than industrial peoples in preserving the ecological integrity of their homelands.

Indigenous peoples have long participated in regional ecological systems, and have done so, largely, in endurable ways. Generally, it is native peoples who continue to occupy the last of the planet's undamaged resource areas. Indigenous cultures have long participated in local landscapes without causing extensive damage to the resource base or the ecological integrity of the land. Indeed, it is for these very reasons that the territories they inhabit are desirable for national parks, wilderness areas, biosphere reserves, and other categories of protected areas.

To be most successful, the management of protected areas must acknowledge indigenous rights, including land and sea rights, subsistence rights, and rights to self-determination. This approach challenges the principles through which national parks and other protected areas have operated for over a century. However, it offers an ethical alternative to imposed conservation strategies that deny the rights of local inhabitants. Furthermore, these new conservation alliances promote more effective strategies for the protection of cultural and biological resources. This approach stresses that we should regard the knowledge, insights, and skills of local peoples as assets to environmental conservation (Stevens 1997b).

Community-based conservation is consequential not only in areas of statutory protection, but within the rural and outback regions that lie outside the boundaries of parks, refuges, and the like. To focus conservation efforts only within protected areas is to relinquish the majority of Earth's land surface, much of which is still biologically rich. We do urgently need more land with statutory protection, but for these conservation areas to be most effective, indigenous people must have proprietary rights.

An international conservation priority should be the creation of indigenously inhabited, comanaged, and locally managed protected areas. A number of such conservation alliances currently exist; Xingu National Park in the Brazilian Amazon, the wildlife management areas of Papua New Guinea, Kakadu National Park in Australia, and the Annapurna Conservation Area of Nepal are a few examples. With varying success, these protected areas promote the ideal of indigenous inhabitants maintaining their cultural integrity while safeguarding natural resources from outside exploitation.

Kakadu and Uluṟu-Kata Tjuta (Ayers Rock-Mount Olga) are two Australian National Parks established on lands wholly or partly owned by their Aboriginal inhabitants, who lease the areas to the government. The leases contain provisions to ensure Aboriginal property rights, partnership in park management, and other cultural concerns. The current Uluṟu-Kata Tjuta lease stipulates that Aboriginal owners must hold a majority of seats on the managerial board, and requires that meetings be conducted in the local Pitjantjatjara language to assist Aboriginal empowerment. Similar stipulations are made in the Kakadu land lease, and 10 of the 14 seats on Kakadu's management board are held by resident indigenous peoples. Nonetheless, joint management is constrained by the complexities of intercultural communication, inequitable power distribution, differences in skills and levels of training, and numerous other factors.

Nepal's Annapurna Conservation Area is among the most ethnically diverse and heavily populated of the world's

inhabited protected areas. The King Mahendra Trust for Nature Conservation (a national nongovernmental organization) is responsible for its administration, while all conservation and development activities are carried out by local villages. While creation and management of conservation areas have traditionally been the responsibility of government agencies, the Nepali approach in the Annapurna region is unique in placing the management of protected areas with a nongovernmental organization and local villages. Now that conservation authority has largely been restored to the communities, indigenous forest management practices have been adapted and revived. The Annapurna Conservation Area Project staff (most of whom are indigenous) serve as liaisons between villagers, government agencies, and international organizations.

This Project approaches environmental protection, conservation, cultural survival, and development as interlinked objectives. Among their goals are the reinvigoration of traditional resource management, the introduction of new conservation practices, implementation of development projects, and motivation for villagers to work cooperatively to ensure sustainable resource use and cultural autonomy. Regulations and activities are based on cultural traditions and principles of local empowerment and community participation. While the Annapurna Conservation Area Project was not initiated by indigenous residents, it explicitly recognizes local land use practices and makes comanagement the basis of conservation and development schemes. The various manifestations of its projects—from alternative energy production and tourism to reforestation and new entrepreneurial activities—offer examples of how local resource management can employ nontraditional strategies, while strengthening traditional ones. As Stan Stevens (1997b) affirmed, it is important to recognize that what has been achieved in the Annapurna region is the result of a partnership, and is neither a solely grassroots nor top-down initiative.

Similar to biosphere reserves, the Annapurna Conservation Area is comprised of a series of zones, including a fully protected wilderness area in the highest elevations, a protected forest and seasonal grazing belt, and an intensive use zone where habitation, farming, tourism, and community forestry are the focus. The protected core of the Annapurna Conservation Area is, in theory, buffered with sustainable human use zones. In the intensive use zone, villagers (fig. 2) are supportive of the conservation area, and understand that visitors bringing income are attracted by the natural features of the region. The forests and grazing zones are concessions to the locals; livestock is income-generating and a symbol of wealth, so people are determined that grazing be sustainable, not eliminated.

In the Himalayas, numerous conservation projects have failed because they focused mainly on regulations and their external enforcement. The failure to recognize local knowledge and institutions, and to involve locals in planning and implementation, has inhibited projects, contributing to their failure. Many of these failed projects have not targeted the underlying social and economic factors that have led villagers to illegally extract resources from protected areas. Hence, the Annapurna Conservation Area Project is an attempt to incorporate nature protection, tourism, forestry, agriculture, and the needs of local people in managing the program

Figure 2—Mother and child, Ghandruk, Annapurna Conservation Area, Nepal.

(Bunting and others 1991). Conservation efforts—in Nepal and elsewhere—become fully effective only when coercion gives way to cooperation.

Integral to successfully inhabited protected areas is the incorporation of traditional ecological knowledge, values, practices, and beliefs into planning and management. These protected areas will also be a focus of efforts to create culturally devised development schemes including cultural arts, appropriate forms of tourism, and local development. Coordination and consultation among indigenous peoples about the benefits and risks of conservation areas will enable them to better assess the ramifications of proposed conservation projects (Stevens 1997c).

Successful comanagement of inhabited conservation areas will involve genuine power sharing, where indigenous residents are not relegated to a merely advisory role. For their part, indigenous peoples will share the responsibility in protected area partnerships. As Stevens (1997c) has noted, they must make efforts to maintain local knowledge, and to do so even amid possible major changes in ways of life, values, and concerns.

International coordination among indigenous peoples, governments, nongovernmental organizations, and conservationists will lead to exciting new models for inhabited protected areas. Such new alliances may ultimately reshape environmentalism in our contemporary, interconnected world. These partnerships, however, are not easily forged; tremendous challenges of intercultural communication, divergent value systems, different development and conservation ideals, and not least, competition for resources (natural, monetary, and cultural) will confront the architects and implementers of these new models.

The very concept of "management" of natural resources must be applied with caution in traditionally oriented communities. While not all traditional practices result in sustainable management of resources (especially in our convoluted, global world), conventional indigenous knowledge is the basis of considerable behavior that results in the sustainable use and conservation of resources. The context and motivation for indigenous resource management, however, are often radically different from that of nonindigenous

management (Healey 1993). Since antagonisms can often arise from such differences, partnerships between indigenous peoples and Western conservationists should include provisions for mediation and conflict resolution. Nonetheless, successful comanagement should not be measured by the absence of conflict, because this may simply be an indication that the real issues are not being addressed. Effective management acknowledges the inevitability of conflict, and evaluation should be based on the extent to which conflict is resolved to the satisfaction of the management partners.

As I was leaving Kakadu National Park after a recent visit, I shook Mick Alderson's hand and asked him what advice he could give me to take back to the United States to share with Native American communities interested in conservation issues. (As a resident Aboriginal, Mr. Alderson is Chair of the Kakadu Board of Management and is Cultural Advisor to Parks Australia.) He replied, "Well, first they gotta get more of their land back, don't they? Then they can begin to manage it properly." Ecological management, in his eyes, is not solely a conservation issue; it is an element of the wider concerns of land rights, social justice, and cultural integrity.

Globalizing the Local

The environmental movement grew out of efforts to resist local environmental damage. Recent trends in environmentalism, however, are such that the "local" is fading from the arena of primary concern, and is being replaced by an emphasis on so-called "global" environmental problems. Solutions, too, are being taken as necessarily global in nature. But the globalization of environmental problems conceals the restorative potential of local solutions. Prioritizing the global over the local has not only exacerbated degradation of the environments that support indigenous (and other) subjugated peoples (Shiva 1993), but has also made it difficult to address many of our most critical social and environmental problems.

Both the empowerment of indigenous peoples and the conservation of native lands is to be realized through coalitions of local interests. Whether the global/local interface can withstand the multinational, industrial onslaught depends, partly, on local community access to authentic participation in environmental decisions. If global/local undertakings are to succeed, communities must be integrally involved in the design and implementation of conservation schemes.

Global ecology—the tenet that the planet functions as a single system built on a network of interconnected local systems—calls for global political action yet to be defined (Sachs 1993). Ecological communities are only relatively self-sustaining; none is fully independent because air and water flow across the planet and animals migrate between bioregions (Berry 1993). Human populations, as well, appear to have always positioned themselves at ecological boundaries—ecotones—where they can move between zones to take advantage of diverse and abundant resources.

Economic, environmental, and social sustainability at the global level hinges upon local level resource management decisionmaking processes. As I have emphasized, the local is primary and the global is derivative; it is at the local level where resource users are more likely to share power, authority, and consequences, and to do so in a way that incorporates continual assessment, revision, and equity.

Globalization founded on a model of biospheric resource extraction is causing severe damage, some irreversible, to the planet. The comprehension of environmental problems and the implementation of solutions is often most successful when it is an intercultural enterprise. An applicable global ecology is built upon a partnership between local communities and outside peoples. Global ecology, while planetary in scope, prioritizes local communities; it reflects and respects local people's rights to self-determination, while building self-reliance, strengthening local institutions, providing enduring benefits, and granting genuine incentives for cooperative conservation (Stevens and Sherpa 1993).

Mainstream program developers and evaluators have conventionally viewed conservation as divided into two independent (and even competing) factions: biological and social. But globalism demands a new agenda for environmentalists confronting the socio-ecological crisis. Environmentalism is essentially, though not uniquely, a quest for a viable future, and an environmentalism rooted in diverse ecological knowledge and embracing an intercultural perspective can make land preservation policies more equitable and effective.

Local communities can be revitalized partly through national and international sanctioning of their self-reliance, economic and political control, and environmental autonomy. National and international power elites, however, are unlikely to voluntarily recognize the sovereignty of indigenous peoples, or to relinquish control in favor of cooperation. This is why coalitions of indigenous peoples and conservationists are so critical; such coalitions will be better positioned to defend a view of sustainable resource use that is linked to local community empowerment. In culture—as in nature—the global must accede to the local.

Toward an Intercultural Ecology

Despite the trend, globalization does not necessarily mean economic exploitation, cultural annihilation, and environmental despoliation. Globalization always involves the intersection of the local and the global, but the nature of this relationship is indeterminate. From a human rights and ecological perspective, however, the elimination of social oppression and environmental degradation is predicated upon the global blending with the local.

While globalization has essentially entailed a top-down process, indigenous peoples have responded with their own brand of globalization-from-below. They have partially succeeded in this by shifting concerns from the national spectrum to the international arena (Falk 1993). With respect to the environmental and indigenous rights movements, transnational activism began to emerge as an important social force during the 1980's. One effect of this international posturing has been the movement away from the political resistance within a state toward a transnational arena that radiates influence in a variety of directions, including back to the community of origin. Increasingly, environmentalists

endorse local community rights, while indigenous peoples adopt the interests and language of international conservation movements, assuming the role of local "trustees" on behalf of global interests.

Transnational entities and multilateral agencies are ensconced actors in globalization. But so, too, can indigenous peoples be indispensable players. In this locally driven globalization, indigenous peoples exist not only at the provincial level, but at the international. The colonial bequest of weakened and fragmented local communities is remedied through a new multiethnic political strategy. But in the long run, neither an exclusively endemic nor imposed initiative will work. Rather, an appropriate and sustainable form of globalization can emerge only from partnerships.

This new social dialectic does not attempt to "deculturize" groups, but rather seeks common ground in the face of fragmentation. The rise of transnational rights movements has enabled indigenous people to turn local marginality into national and international empowerment. Cultures can remain autonomous and interconnected at the same time, because autonomy does not oblige radical separation and complete independence. Indeed, the autonomy of native cultures in our contemporary world is strengthened by selective interconnectedness, feedback, and influence.

While computer networks of indigenous groups cannot fully rectify the fragmentation of communities (technology is not a surrogate culture), it can begin to redress it. Computer conferencing will never substitute for grassroots, face-to-face organizing, but it can link common concerns and strategies through a network of intercultural cooperation. The grassroots computer subculture has spawned something hopeful; indigenous networks that are redefining political and environmental organizing. The flow of information in environmentalist discourse is not solely from an urban technological center to a nonindustrial hinterland; increasingly, information is generated and distributed from an indigenous locus to a diffuse periphery.

Linking local struggles with global support is key to making globalization work for, rather than against, social and environmental justice. A well-known success, among many, is the international network of indigenous peoples, environmental activists, and trade unionists who supported the struggles of Chico Mendez and Indian rubber tappers in Brazil, ultimately pressuring the World Bank to alter its development policies in the Amazon (Brecher and Costello 1994).

It is patronizing and paternalistic, perhaps, to allude only to how intercultural networks and information technology can aid indigenous peoples, because their ecological insights can benefit industrial societies immensely. Nature is more complex than we ever can know, and for environmentalists working in the global arena it behooves us to seek the information and wisdom of local traditions that might enhance and expand our understandings. Environmentalists should undertake an active search for partnerships that build on the enormous diversity of traditional ecological knowledge and local conservation solutions.

This globalization, implanted in the local, will manifest a civil society that affirms bioregionalism and diversity, and embraces the particularities of indigenous cultures while promoting interconnected communities. It will be as plural as the cultures and ecosystems that constitute the planet. The challenge and opportunity of this globalized local is that we all must participate in our local communities and bioregions while sharing in the international responsibility of ecological stewardship.

An ecological metaphor for this global/local environmentalism is the ecotone—the intersection between natural communities where diversity is enriched through the blending of the two. Here, natural elements coalesce, and species intermingle in heightened richness.

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VII. International Cooperation in Wilderness Protection

Dr. Ian Player, Chairman of the South African Wilderness Foundation and Founder of the World Wilderness Congresses, with wife, Ann (photo by Marilyn Riley).

Council process, an open forum for speaking and listening, is practiced by a group of Congressional delegates on a post Congress field trip (photo by John Hendee).

Seabirds in the Marine Wilderness of the Western North Atlantic

Falk Huettmann

Abstract—Presenting the largest habitat in the world, patterns and processes of oceans beyond the inshore area are poorly investigated. Seabirds are among the best researched marine creatures, but their research at sea still presents the last frontier in field ornithology. The Programme Inté gré de recherches sur les oiseaux pé lagiques (Integrated Research Program on Seabirds, or PIROP) database of the Canadian Wildlife Service is one of the largest data sets on pelagic seabird distribution. In concert with biotic and abiotic environmental factors, this data set presents a unique opportunity to study how marine animals interact across national borders (Canada, Greenland, and the United States) with the unconstrained forces of nature in the huge marine area of the Northwest Atlantic, from the Gulf of Maine to the Canadian Arctic. This Marine Wilderness offers a mosaic of several "hot spots," including threats such as dependence on ocean currents driven by the global climate, as well as those normally related to human activities such as overfishing, oil pollution, and traffic. This paper presents results from an international, multidisciplinary 3-year research project that used advanced tools such as Geographic Information Systems (GIS), remote sensing, international governmental long-term databases, spatial statistics, the Internet, modeling, Landscape Ecology approaches, and seabird surveys at sea. Implications for seabird conservation and management are shown also, emphasizing that knowledge of Marine Wilderness is insufficient.

Presenting the largest habitat in the world, oceans cover more than two-thirds of the globe, and the vast areas far away from land can truly be considered as Marine Wilderness. Marine Wilderness in the western North Atlantic, defined here as remote areas at sea far away from shore, lies in international (Canada, Greenland, and the United States) waters and is not fully researched and monitored, nor does it enjoy proper and consistent protection. Coastal areas, here defined as the waters within 5 km of the shore, are easier to access and enjoy better monitoring. Seabirds are among the best researched marine creatures, but seabird research at sea still presents the last frontier in field ornithology. The only information about seabirds in the Marine Wilderness of the western North Atlantic stems from surveys, based on vessels of opportunity, carried out by the Programme Inté gré de Recherches sur les Oiseaux Pé lagiques (Integrated Research Program on Seabirds or PIROP). This paper is based on a 3-year study by the author, investigating the importance of the Marine Wilderness for seabirds using PIROP, environmental long-term data sets from a variety of sources, and Geographic Information Systems (GIS).

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Description of the Study Area and Marine Wilderness

The study area (fig. 1) of this research project is located in the western North Atlantic, from the Gulf of Maine to the Canadian Arctic (Brown 1986; Brown and others 1975; Diamond and others 1993). Brown and others (1975) present an "oceanographical zonation" for this "Seascape" (Huettmann and Diamond 1998c) based on Ashmole (1971), Dunbar (1968), and Salomonsen (1965, 1972), and divides the water bodies into high arctic, low arctic, boreal, and cool subtropical without further temporal or vertical reference. A classification based on biodiversity criteria and indicators was not carried out for the study area (Angel 1993; Gaskin 1995).

There are nine major surface currents and streams in the study area, such as the Gulf Stream and the Labrador Current (Backus and Bourne 1987; Drinkwater 1996; Greenberg and Petrie 1988; Salomonsen 1965; Stommel 1965). Due to a funnel effect (Defant 1961), areas with fast currents can be found in the study area, for example, Flemish Pass, Strait of Belle Isle, and Grand Manan Channel. Salinity increases with distance to the coast.

The occurrence and locations of fronts and eddies are well described for the southern study area and they are among the richest and most productive regions in the study area (Fournier 1978; Loder and Greenberg 1986; Mann and Lazier 1991; Olson and Backhus 1985; Wiebe 1977). There are major banks in the study area, some of which play a role in global fisheries: Grand Banks, Labrador Banks, St. Pierre Banks, and the Scotian Shelf. All of these banks are relatively close to the coast and, therefore, considered part of the Continental Shelf. Other distinctive features of the study area are deep sea channels and deep sea basins. The study area has few sea mounts and no active underwater volcanoes.

Being one of the most important fishing grounds in the world, the southern study area is heavily used by the international fishing fleet and, therefore, divided into management zones by the North Atlantic Fishing Organization. Due to the relevance of the western North Atlantic as a traditional fishing ground, an oil resource, a mining resource, and until very recently, as a strategically important area for submarines, the political setup of the study area is quite complex.

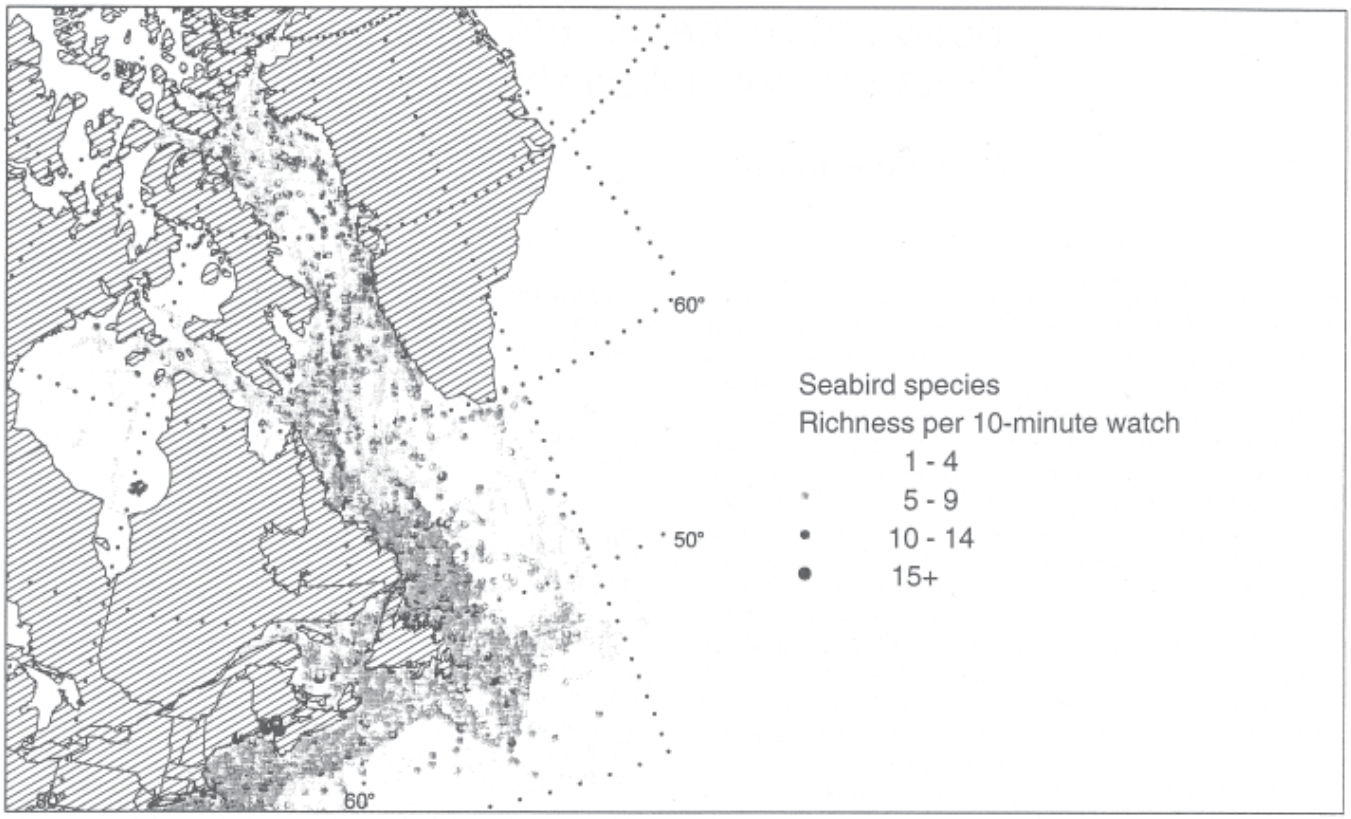

Figure 1—Map showing locations of observed seabirds in PIROP, 1967-1992, and the seabird species richness for the study area.

Agnew (1993) discusses the Davis Strait/Labrador Sea as one of three regions with high sea ice and atmospheric variability. The region from the Middle Atlantic Bight to the Grand Banks exhibits the highest inter-annual variability of sea surface temperature anywhere in the North Atlantic Ocean (Cayan 1986 in Petrie and Drinkwater 1993; Drinkwater 1996; Petrie and others 1992). One reason for this variability is the connection of the study area with the global climate and global seas. However, the biologically important Cold Intermediate Layer is relatively stable. One of the biggest environmental changes in this marine ecosystem, a near surface event known as the "Great Salinity Anomaly," occurred throughout the southern study area from approximately 1969 to 1972 (Angel 1993; Mertz and Myers 1994). Furthermore, Mann and Drinkwater (1994) and Drinkwater (1996) described the North Atlantic Oscillation (NAO) and big variations of the NAO Index occurring from 1900 to 1986. Severe and overall changes can be expected for the study area in the event of global warming (Mann and Lazier 1991; Montevecchi and Myers 1997). In particular, the southern section of the study area is threatened by overfishing (Backus and Bourne 1987; Wilson and Addison 1984 for Gulf of Maine) (do Carmo Gomes 1993; Harris 1998 for Grand Banks) and contamination by radionuclides, chemical and thermal effluents from the Point Lepreau Nuclear Power Plant (Nelson and others 1998). It is also threatened by industrial sources, heavy metals, and sea floor contamination in the Bay of Fundy/Gulf of Maine (Backus and Bourne 1987; Braune 1987; Braune and Gaskin 1987; Gaskin 1987; Loring 1981, 1982).

The biggest threats, oil exploration and the transportation of oil and cargo, can be found in the southern highly populated areas (Backus and Bourne 1987; Nettleship 1997). Traffic already accounts for considerable mortality to endangered North Atlantic right whales (*Eubalaena glacialis*) (Brown and others 1995; Gaskin 1987) and poses significant threats of oil spills to wintering auk populations (Green and Hirons 1993; Lock and others 1994).

The arctic regions have not been fully investigated for threats or for their potential as protected areas (Beckmann 1995). Although the need for protected areas at sea has been emphasized by a variety of researchers and agencies (Nettleship 1997; Shackell and Willison 1995), there are no regions at sea within the study area that have any true, year-round protection status.

Data Sets

Integrated Research Program on Seabirds

Initiated by the Canadian Wildlife Service in 1966 for monitoring seabirds at sea, the Integrated Research Program on Seabirds (PIROP) database originally consisted of vessel-based 10-minute seabird counts in the western North Atlantic (Brown 1986; Brown and others 1975; Lock and

others 1994). This program also includes aerial survey data and a large amount of occasional observations of sea mammals and birds other than seabirds, such as waterfowl and passerines (Lock and others 1994). The PIROP database is fully digitized (dBASE, relational database) and includes software for analytical GIS work and convenient data entry (Huettmann and Lock 1997). It was recently extended with the addition of the U.S. Manomet Seabird data for the Gulf of Maine area (Powers and others 1979). With 26 years (1966 to 1992) of seabird-at-sea observations, PIROP is the largest data set on this topic (Diamond and others 1993; Lock and others 1994) and is available for the scientific community.

Environmental Data Sets

For this study, 20 environmental data layers were used for GIS overlays in combination with PIROP within the study area (table 1) (Huettmann 1997a). All data sets used are available for the scientific community free of charge and were derived from satellite images, and official oceanographic, meteorological, and governmental data sources. Data transfer was accomplished via the Internet (ftp, WWW, and email) or sometimes digital media (floppy disks, zip disks, and CD-ROMs); the Internet option proved to be the best, most convenient way to locate, present, and transfer/download data and subsets from large public databases across platforms.

Table1—Overview of the data sets used to investigate Seabirds in the Marine Wilderness.

No.	Name of data set	Data source	Data type	Units	Time cover
Seabirds					
1	PIROP	Bedford Institute for Oceanography, Environment Canada, Canadian Wildlife Service, Manomet Bird Observatory	Continuous	Seabirds within a 10-minute block	1966-1992
Atmospherical					
2	Atmospheric temperature at 880 mbar	Pathfinder (NOAA)	Continuous	Kelvin	April 1987-December 1988
3	Standard temperature atmospheric at 880 mbar	Pathfinder (NOAA)	Continuous	Standard deviation	April 1987-December 1988
4	Wind speed	COADS (NOAA)	Continuous	Meter/second	1854-1993
5	Air pressure at sea level	COADS (NOAA)	Continuous	Mbar	1854-1993
6	Air temperature	COADS (NOAA)	Continuous	Kelvin	1854-1993
7	Wind when seabird observation was done	PIROP	Discrete	Classified	1966-1992
Geographical					
8	Sea depth	ETOPO5	Continuous	Meters	1988
9	Slope of sea floor	SPANS-GIS from ETOPO5	Continuous	Degrees	1988
10	Aspect of sea floor	SPANS-GIS from ETOPO5	Discrete	Classified	1988
11	Distance from coast	SPANS-GIS	Discrete	Distance bands	1998
12	Distance from a seamount	SPANS-GIS from ETOPO5	Discrete	Distance bands	1996
Water					
13	Sea surface temperature	WOA (NOAA)	Continuous	Degrees Celsius	1948-1988
14	Water temperature at 30 m depth	WOA (NOAA)	Continuous	Degrees Celsius	1948-1988
15	Sea surface salinity	WOA (NOAA)	Continuous	Parts per million	1948-1988
16	Water salinity at 30 m depth	WOA (NOAA)	Continuous	Parts per million	1948-1988
17	Salinity difference surface - 30 m depth	SPANS-GIS based on WOA (NOAA)	Continuous	Parts per million	1948-1988
18	Temperature difference surface - 30 m depth	SPANS-GIS based on WOA (NOAA)	Continuous	Degrees Celsius	1948-1988
19	Sea state when seabird observations were done	PIROP	Discrete	Classified	1966-1992
Additional Data Sets					
20	ECNASAP groundfish	Department of Fisheries and Oceans, Dartmouth	Continuous	KG biomass, species richness	1970-1994
21	Seabird colonies	Lock and others 1994, Cairns 1989	Continuous	Breeding pairs	1989, 1994

Seabirds in Summer

The distribution of seabirds at sea is most easily monitored in summer, due to relatively mild weather conditions and ongoing colony-based research. Most of the seabird colony locations in the study area are well known (Boertmann and others 1996; Cairns and others 1989; Nettleship 1980). However, systematic sampling of the huge oceanic ecosystem is rarely attempted, and opportunistic sampling, such as PIROP, is the source of most information (Brown 1986).

The temporal extent and timing of the breeding season for seabirds in the study area is mostly a function of latitude; Diamond and others (1993) define a northern and a southern breeding regime (borderline at approximately 52° N). During the summer, breeding seabirds are attached to their breeding colonies due to the need for providing their chicks with food (Huettmann and Diamond 1997b; Weimerskirch 1998). Most of the seabird species in the Canadian North Atlantic have up to 40 percent nonbreeders in their population (Diamond and others 1993), which could theoretically be found dispersed all over the Atlantic because they are not constrained in their movements by the duty to provide for their chicks. Breeding in the southern hemisphere, Wilson's storm petrels (*Oceanites oceanicus*) as well as greater (*Puffinus gravis*) and sooty shearwaters (*P. griseus*) are the only seabird species that occur in great numbers in the study area without actually breeding there.

Seabirds in Winter

Research about seabirds at sea presents "the last frontier in field biology" (Brown 1981 in Thurston 1990). The importance of this statement can be shown by the marginal scientific knowledge about seabird distribution during winter months (November through February) in the offshore region of the North Atlantic (Brown 1986; Nettleship and Birkhead 1985; Powers and others 1979). Significant seabird information for this time of the year (for example, their distribution within the Marine Wilderness) is scarce (Gaston and McLaren 1990; Huettmann and others, in preparation). So far, it is believed that most pelagic seabird populations, such as thick-billed murres (*Uria lomvia*) and Atlantic puffins (*Fratercula arctica*), simply disperse in winter over the vast Northern Atlantic (Nettleship and Birkhead 1985). The small amount of existing information for this time of the year includes some feeding studies (Elliot and others 1990; Falk and Durinck 1993) and movement patterns (Donaldson and others 1997) derived from work in Greenland, the "Turr" (mostly thick-billed murres and common murres *Uria aalge* that hunt off Newfoundland), polynyas (Brown and Nettleship 1981), and ice cover (Orr and Parsons 1982). Large data gaps for winter also exist in PIROP. Therefore, transferring knowledge derived from seabirds found in comparable areas elsewhere offers perhaps the only way to learn more on how seabirds cope with winter in the Marine Wilderness (see Divoky 1979 for the Pacific) (see Ainley and others 1993; Hunt and Nettleship 1988 for the Antarctic) (see Durinck and Falk 1996; Joiris 1983 for the North Atlantic).

Migration

All seabirds in the North Atlantic migrate. Normally, their migration covers many hundreds of kilometers and is affected by foraging, breeding, molting, flight energetics, and the travel between winter and summer grounds (Furness and Burger 1988; Newton and Dale 1996; Pennycuick 1987). The importance of the Marine Wilderness for migration, for resting areas, and as a flyway for North Atlantic seabirds is not well known; these topics are difficult to investigate in the field, and most knowledge consists of rough descriptions and arrows on maps (Braune 1987; Furness 1987; Powers 1983; Tuck 1961). The only quantitative information on seasonal seabird migration stems normally from recoveries of birds banded in colonies during summer (Brewer and others, in preparation) or, to a lesser degree, from terrestrial and at-sea observations (Stenhouse and Montevecchi 1996). Satellite transmitters offer the best data on movement patterns, but to date have been applied to larger seabirds only and not in the area covered by PIROP (Prince and others 1992).

Methods

For analyzing seabird distribution during winter and breeding season, the PIROP database was queried with FoxPro (Siegel 1995) for the particular months. Only seabird species that had sufficient observations were included; resulting data were then imported and visualized in a GIS format. I am using SPANS-GIS (Huettmann 1998; Huettmann and Diamond 1998a; INTERAC TYDAC 1995) to present bird observations in the study area, to create surfaces for environmental data layers (Huettmann 1998), and to overlay different data layers per month (Huettmann 1997a) for further statistical analysis in SPLUS (StatSci 1995). Logistic regression and Classification and Regression Trees were used to test for significant results (StatSci 1995). Seabird queries for the environmental data overlays were filtered for "standardized seabird counts" following Tasker and others (1984). To track seabird movements during the year, locations of observed juveniles and molting seabirds in PIROP were queried and then analyzed per month in SPANS-GIS.

Results and Discussion

Seabirds in Summer

Due to their limited feeding range, breeding seabirds in the study area show a very coastal distribution concentrated around their seabird colonies (Huettmann and Diamond 1998b). For most of the breeding seabirds, such as northern gannet (*Sula bassanus*), black-legged kittiwake (*Rissa tridactyla*), northern fulmar (*Fulmarus glacialis*), herring gull (*Larus argentatus*), great black-backed gull (*L. marinus*), Iceland gull (*L. glaucoides*), glaucous gull (*L. hyperboreus*), thick-billed murre, common murre and Atlantic puffin, high concentrations occur on the west and north shores of the St. Lawrence region, Labrador coast, east Newfoundland coast,

northern Hudson Bay, West Greenland, and the Canadian High Arctic. These are areas that are normally free of ice in the pre-breeding season (Huettmann and Diamond 1998a).

For seabird species included in the investigation of the environmental data overlay with PIROP for the breeding season (black-legged kittiwake, common murre, thick-billed murre, northern fulmar, Atlantic puffin, northern gannet), results show a complex situation with several factors determining their distribution and colony locations. However, depth, distance to coast, sea floor aspect, and meteorological parameters such as sea level pressure, wind speed, and air temperature are significant factors for the seabird distribution in summer. Nonbreeding birds were observed either close to these colonies (most likely in order to obtain mates for breeding and to occupy potential breeding sites) or far away from any colonies. We assume that the latter birds are normally young individuals that disperse from their original colonies to look for potential mates elsewhere or to feed opportunistically in areas where food is plentiful and easily accessed. During the breeding season, northern fulmars (likely nonbreeding individuals from the whole northern Atlantic) can be found on the Labrador Shelf (Hatch and Nettleship 1998). Baird (1994) presents that the Grand Banks are of international importance for black-legged kittiwakes year round. Nonbreeding northern gannets were observed in the Grand Manan region. Our data show an abundance of greater shearwaters in the southern study area from mid-May through July (breeders) and June through November (nonbreeders) carrying out a trans-equatorial migration from the southern hemisphere for molting (Brown 1988).

During summer, the Marine Wilderness is not used by most seabirds to the same extent as the coastal zones. Even nonbreeding birds, with the ability to range freely, were most often found in offshore regions of the Continental Shelf.

Seabirds in Winter

Environmental data suggest that the winter season must be divided into early (November and December) and late winter (January and February). The Davis Strait is still open in early winter but is covered with sea ice in December, driving most arctic birds into southern waters such as the Labrador Sea, Grand Banks, Scotian Shelf, and Gulf of Maine. This is also supported by observations indicating that the marine environment changes substantially from the early winter season to the late winter season (Braune 1987 for early winter plankton peak in the Bay of Fundy; Elliot and others 1990 for shift of seabird prey).

The environmental data overlays with seabirds in PIROP for the winter season were done for the following species: black-legged kittiwake, dovekie (*Alle alle*), northern fulmar, great black-backed gull, herring gull, white gulls (Iceland gull, glaucous gull, ivory gull *Pagophila eburnea*, Ross's gull *Rhodostethia rosea*), and large auks (thick-billed murre, common murre, Atlantic puffin, razorbill *Alca torda*). Results show that mostly sea floor aspect, distance to coast, and the classical oceanographical factors such as water temperature, salinity, and wind speed determine seabird distribution in winter. The data clearly indicate a pelagic distribution for northern fulmars and black-legged kittiwakes. Great black-backed gulls and herring gulls were found offshore, but are mainly coastal (Root 1988). Large auks were observed offshore, but the winter hunt on "Turrs" and, in particular, findings from winter surveys off Grand Manan for wintering razorbills indicate a very high density of wintering birds in inshore (less than approximately 5 km from land) coastal waters (Huettmann and others, in preparation; Root 1988). Root (1988) indicated that the Grand Manan and Passamaquoddy Bay area also hosts the largest numbers of black-legged kittiwakes observed during Christmas bird counts on the North American continent. Iceland gulls were mostly found in coastal areas southwest of Newfoundland, Cape Breton, south of Nova Scotia, and around the Magdalen Islands. Root (1988) reports that observations of Iceland gulls were high at the extreme southeastern point of New Brunswick. In terms of their distribution, Iceland gulls can, therefore, be labeled as coastal birds in winter.

These results suggest that, in terms of numbers and concentrations of seabirds occurring in the study area during winter, the coastal waters may be more important than suggested earlier, at least for the southern study area such as the Bay of Fundy, southern Nova Scotia, and the Gulf of Maine. Ice-free coastal zones in the study area present an important wintering ground for most seabird species, where they share their habitat with other waterbirds, such as waterfowl, grebes, and loons (Root 1988). I conclude that coastal zones must present a richer habitat for seabirds in winter than the ice-free Marine Wilderness far offshore.

Post and Pre-Breeding Migration

Seabird migration can be characterized as a directed movement between summer and winter grounds. Although migration strategies for seabirds are not that well researched, at least some resting grounds during migration are roughly known. My results indicate that juvenile thick-billed murres do not show a rapid southward movement after leaving the colonies. Their migration flyway seems to follow the coastline and shelf edges, instead of crossing the open sea directly (except for the Davis Strait off the Cumberland Peninsula). Most of the northern gannets leave the breeding colonies in the St. Lawrence estuary and off Newfoundland completely by September, and then return in mid-April. Greater shearwaters arrive in the study area beginning in mid-May, followed by juvenile birds during the next months. They can be found in the coastal waters off southern Newfoundland feeding on capelin (*Mallotus villosus*) and have been observed dispersing as far north as Greenland. After July, they make full use of the whole North Atlantic. Breeding birds seem to leave the study area starting in July; remaining birds, likely nonbreeders, can be found in the area until December. Northern fulmars were observed in the study area year-round. Hatch and Nettleship (1998) indicate that birds in North America generally do not show a directed movement, except perhaps birds from the High Arctic. However, due to the presence in the study area of birds from the whole North Atlantic, movement patterns can be detected from changing numbers on the banks. Black-legged kittiwakes were found all over the study area, with high densities in the Gulf of Maine region in winter. Herring gulls show a clear removal from the St. Lawrence area during

winter and a southward movement for wintering to the Gulf of Maine and beyond. Great black-backed gulls exhibit the same wintering pattern as herring gulls, but breed farther north. Iceland gulls move between winter and summer grounds along the coastal shelf edge and ice edge. Glaucous gull movements indicate a more pelagic wandering than Iceland gulls.

General

The distribution and biology of seabirds that are rare, difficult to determine, and hard to see or count at sea still presents a challenge, and their conservation status and biology remain unknown in the study area. Jaegers (*Stercocarius parasiticus*, *S. pomarinus*, *S. longicaudus*), and Cory (*P. diomedea*) and Manx's shearwaters (*P. puffinus*) occur in the study area, but even basic biological knowledge is lacking. The world's largest known nesting colony of Leach's storm-petrels (*Oceanodroma leucorhoa*) can be found in the study area on Baccalieu Island on the Grand Banks (Sklepkovych and Montevecchi 1989), but their feeding grounds, wintering grounds, and movement patterns are not known. Schneider and Heinemann (1996) indicate the importance of the southern study area for two other seabird species from the southern hemisphere (Wilson storm petrel and sooty shearwater), but details on distribution, population, and biology for these species are only conjecture.

Conclusion

The importance of the Marine Wilderness for seabirds is not known nor fully monitored. The results, so far, indicate that coastal areas, and to a lesser degree the Continental Shelf, are key zones for seabirds during the winter (such as the Bay of Fundy, southern Nova Scotia, and the Gulf of Maine) and during the breeding season (almost the entire coastline of the study area) (see fig. 1). The shelf edge is used by most seabirds for activities such as feeding, migrating, or roosting (nonbreeders). For the study area, I conclude that the Marine Wilderness presents a relatively poor and homogenous environment for seabirds (see also Dunbar 1968 for the arctic; Wiebe 1977 for mosaics in boreal waters) where environmental conditions can be extreme and prey is difficult to catch. Shallow but remote areas at sea, such as the extending Continental Shelf, are used by truly pelagic seabird species, such as black-legged kittiwakes and northern fulmars, and for a relatively short period of time by greater shearwaters, herring gulls, and great black-backed gulls.

Besides other basic biological parameters in winter, habitat use of the Marine Wilderness is not fully known for the Atlantic puffin, thick-billed and common murre, jaegers, manx and Cory's shearwater, and Leach and Wilson's storm petrel. During the migration season, deep-water sections of the Marine Wilderness are used by seabirds like the glaucous gull, Iceland gull, and great black-backed gull to connect winter and summer grounds. I recommend that a specially designed, interdisciplinary seabird survey program be conducted for the Marine Wilderness (with consideration of the area's international nature) to learn more about this huge and important habitat.

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Carlsberg Ridge

Ponathil Sivadas

Abstract—The Carlsberg Ridge, an important physiographic feature situated on the floor of the Arabian Sea, has significant regional effects on biodiversity, atmospheric circulation, and climate variability. The Ridge and adjoining areas thus warrant protection and further investigation and should be included in the category of protected areas in the high seas.

Carlsberg Ridge was discovered during the John Murray expedition (1933-1934). This expedition was sponsored by the Carlsberg Foundation, and the discoverer appropriately named it Carlsberg Ridge. The Ridge is situated almost in the middle of the Arabian Sea and can be traced from there through the Gulf of Aden to the Ethiopian Ridge system. The Ridge runs in a northwest -southeast direction, at an average depth of 3 km.

The Owen Fracture Zone (OFZ) is one of the largest fracture zones of the ocean floor and lies between the Equator and the middle of the Arabian Sea. Carlsberg Ridge intersects the OFZ at its northwest edge and then continues as the Sheeba Ridge into the Gulf of Aden. The Carlsberg Ridge and the Sheeba Ridge lie laterally about 300 km along the OFZ.

The Ridge came into existence approximately 63 million years ago when the spreading system in the Mascarene Basin creased and jumped to the north, separating India from Seychelles. This has created two oceanic conjugate basins: the Eastern Somali Basin and the Western Arabian Basin. It is an active plate boundary between the Somali and Indian Plates. Presently, the Ridge is generating new sea floors at the rate of 24 to 30 km per million years. The right valley is contributing a significant amount of driving force for the Indian Plate, which is currently moving in a northeast/southwest direction.

Ridge System Dynamics and Effects

Carlsberg Ridge acts as a barrier both for sediments coming from the Indus River and for deep water circulation to the southwest. However, some of the fracture zones like the OFZ and others act as conduits to the bottom water entering the Eastern Arabian Sea, thus flowing to the west of the Carlsberg Ridge. Such circulation patterns lead to an upwelling and high productivity off the west coast of India. The upwelling and the disposition of the magma chambers along the central part of the ridge transfer large amounts of heat to the sea bottom, perhaps resulting in the formation of black smokers.

The National Institute of Oceanography (Kerala, India) has undertaken one cruise to the Carlsberg Ridge between 3°30'N–4°30'N and 62°30'E–63°30'E, covering an area of about 15,000 km^2. In addition, thermal anomalies in sediments have been studied. The composition shows basaltic ultra basic salts. The bathymetry studies in this area have been done through sonars. The temperature of the bottom water has been measured at various places, and preliminary studies indicate the presence of hydrothermal vents and black smokers. Although we have no photographic evidence of such black smokers in that area, possibilities are very high for them to occur. If such is the case, the areas are locales of sulphur-reducing bacteria forming large mats. The biodiversity in that area much depends on availability of the homogenous environment.

There are no ridge systems present in the central Indian Ocean. However, the rich diversity of animal life shows the possibility of a community surviving on trophic systems different from the primary, secondary, and tertiary systems prevailing in the photic zone. The presence of animal communities at such depths in other areas with similar environmental conditions would suggest the existence of sulphide-friendly biodiversity in the Carlsberg Ridge area, also.

Another significant role of this volcanically active ridge system is its control of the Indian monsoon pattern. The horizontal forces generated during the outpouring of the magma from the volcanically active ridge has been driving the Indian plate northeastward, resulting in an Indian and Eurasian plate collision and thus the formation of the Himalayas. The high Himalayan mountain range effectively controls atmospheric circulation and the present day Indian monsoon pattern.

Cold Antarctic water from the southwest finds it way into the Somali Basin, warming as it passes through fracture zone magma chambers and thermal vents. As a result of this warming of the dense nutrient-rich water surface along the Somali coast, a highly productive zone rich in phyto-zooplankton and fish is created. The warm deep-sea water along the ridge also becomes habitat for a diverse animal community.

Conclusion

The high seas lying over the Arabian and Somali Basins on the east and west side of Carlsberg Ridge and the adjoining areas in close proximity warrant protection and further investigation of the biodiversity of the pelagic, mid-sea, and abyssal realm. The abyssal animal community is not being investigated currently, owing to the fact that it is not easily reachable. Ridge system dynamics have varied and significantly affect biodiversity, atmospheric circulation, and climate variability. Therefore, the Ridge should be included in the category of protected areas in the high seas.

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The High Seas: Is There Room For Wilderness?

Maxine McCloskey

Abstract—Water is the basic stuff of this planet. No life can exist without it. In fact, life originated in the marine environment, most likely in the cells of bacteria in deep sea hydrothermal vents. It is essential that the world's people pay attention to the oceans, respect them, and protect them from despoliation. We should be good stewards of land, air, and water for our own survival and for the future of the Earth and all life on it.

To review some basic superlatives about the marine environment, it should be noted that approximately 70 percent of the Earth's surface is covered by salt water. This planet should be named "Oceanus" rather than "Earth." Scientists tell us that not only did life originate in the deep, but that more species of life occur in the oceans than on land, and also that marine biomass "...might rival or exceed that of all surface life" (Broad 1997).

The deepest places on this planet are the ocean trenches. The Challenger Deep in the Mariana Trench (east of the Philippines) is the deepest at 36,150 feet (11,022 m) and stretches for 1,550 miles (2,500 km). It is 20 percent deeper than Mount Everest is high. There are nine trenches over 21,965 feet (6,700 m) deep. The Aleutian Trench in the North Pacific is the longest. The trenches can be considered to be inverted mountains like we know and love on land. The lengths of underwater marine mountain chains also exceed those on land. There a total of 39,744 nautical miles (75,600 km) of ridges and rises that encircle the globe.

I mention these few facts to give a better feel for the enormity of the marine environment. I hope to stimulate your interest in and your acceptance of the notion that special, as well as representative, areas in the oceans merit protection under some kind of international system. The long-range future of life on this planet requires it.

Marine Attributes

Geographic, physical, and biological features of the high seas grip our interest. Chemosynthetic life flourishes on the deep sea-floor environment of total darkness, incredible pressure, and extreme cold, but with astounding heat gushing up from hydrothermal vents. Vulcanism spews forth red-hot magma that wells up from deep within the Earth's crust, creating new earth and rich mineral deposits. Various forms of thermophilic bacteria thrive in the abyss.

For thousands of years of human history, the seas have been used for transportation. Not many years ago the high seas, especially the midwaters and the seafloor, were considered to be biological deserts because practically nothing was known about them. This is part of the reason that it may have seemed acceptable in the past to dump refuse and toxins into the oceans. Besides, anything dumped or spilled was quickly out of sight. Now we know that the high seas, clear down to and under the seafloor, support mysterious and bizarre life forms, including gelatinous fish, giant clams, shrimp, and tube worms. Many of these creatures are bioluminescent. It is a whole new world waiting for discovery and research.

Here are a few examples of the kinds of marine features on the seabed, in the water column, or at the surface of the high seas that merit protected status:

- Places of vast plankton blooms or vast swarms of krill
- Sargassum beds and mats that are habitats for migrating sea turtles and eels
- Calving and feeding grounds of great whales
- Nursery areas of great and small whales and other marine mammals
- Routes of highly migratory species
- Critical areas for significant pelagic fish species
- Geological features of unusual scientific interest, such as at current convergence zones
- Tectonic rifts, geothermal vents, volcanoes, ridge crests, and deep trenches
- Seamounts and guyots that support rich biological communities
- Deep-water corals
- Areas of unique biological concentrations
- Areas of endemism
- Essential habitats of threatened or endangered species
- Edges of ice packs
- Representative areas
- Archaeological and cultural features

Threats

This watery world, despite its vastness, is under threat from many forms of human activity. The most serious and immediate threat to retaining viable biodiversity comes from overfishing and the use of destructive fishing methods. Burgeoning human populations have increased the demand for fish. Inadequately regulated or enforced fisheries have caused many fish populations to crash (75 percent are in or are verging on a state of collapse). This generation and those

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of the future are deprived of those benefits of the sea, and biodiversity is impoverished.

Who could have predicted that the incredible populations of cod (*Gadus morhua*) in the northwest Atlantic Ocean would become commercially extinct? They are. This seems to be the same fate of the orange roughy (*Hoplosthethus atlanticus*) and the Patagonian toothfish (*Dissostichus eleginoides*) in Southern Ocean waters—both species being hunted voraciously. Some shark and billfish populations are severely reduced, as are populations of the enormous bluefin tunas. Seabirds and sea turtles are also severely impacted by commercial fishing.

Those animals at the top of the marine food chain succumbed quickly to intense hunting pressures, driving some species to biological extinction, for example: the Biscayne right whale (*Eubalaena glacialis*) and Steller's sea cow (*Hydrodamalis gigas*). Most other populations of great whales were so severely reduced by hunting while under mismanagement by the International Whaling Commission that after years of protection some of them have barely begun to recover. The blue whale (*Balaenoptera musculus*)—the largest animal to have ever lived on earth—is just one example.

Destructive fishing practices, like factory trawlers that scrape the seafloor, purse seines for catching tuna that have also caught hundreds of thousands of dolphins in the Eastern Tropical Pacific, and fine filament driftnets that are practically invisible to all marine life and can be 30 miles long (48 km), contribute mightily to severe reduction of biomass and biodiversity in marine waters. Bycatch is another major problem because juveniles of the target species, other fish species, diving seabirds, marine mammals, and sea turtles are all victims in the rush to mine the seas of their living bounty.

There is a research project underway to test the feasibility of injecting into the deep seabed millions of tons of carbon dioxide (CO_2) that would be captured from the flue gases of coal-fired plants. This process has been proposed as a mitigation option for the amelioration of global warming thought to be associated with increasing atmospheric concentrations of CO_2 (GESAMP 1997). It is presently estimated that under-sea storage would take 200 years before the CO_2 is fully absorbed by the ocean.

When mining of seabed deposits of metaliferous ores begins, the techniques now known will totally disrupt the seabed. Hydrocarbon extraction is already underway. Ocean dumping of refuse and toxic substances, either deliberately or by accident, continues even though the International Maritime Organization has drawn up regulations to control it. Sunken nuclear ships are leaking, and there is great interest in taking bacteria and other organisms from the hydrothermal vents for industry and pharmaceuticals.

Protected Areas on the High Seas

Just as there are systems of protected areas on land to ensure that special geographic, biotic, and historic features continue, similar systems can protect special features of the marine environment.

Many coastal nations have established Marine Protected Areas within their waters of national jurisdiction, up to the limit of the Exclusive Economic Zone (usually 200 nautical miles from shore). The number of reserves is at least 1,300 worldwide, including 15 in the central Indian Ocean (Earle 1995). Most of these marine reserves are located in the near coastal waters. Only a few are located any distance from land.

Australia is studying a proposal to protect a group of seamounts south of Tasmania, which could be Australia's first deep-sea marine protected area. Canada has selected two new pilot Marine Protected Areas off its Pacific Coast: Endeavour Hot Vents, 150 miles (240 km) southwest of Vancouver Island, and Bowie Seamount 108 miles (180 km) west of the Queen Charlotte Islands (Fisheries and Oceans Canada 1998).

Attention is only now being paid to the high seas, those marine areas beyond national jurisdiction, beyond the Exclusive Economic Zone. Common sense recognizes the attributes that deserve protection within a nation's Exclusive Economic Zone can also occur on the high-seas side of that invisible boundary of 200 nautical miles.

I am not suggesting that protection be accorded to all the high seas, only those special areas that are or could be under threat or that contain outstanding natural features. Certain fish stocks, for example, are in desparate need of protection of the critical habitats directly related to the welfare and survival of the species, such as spawning areas, nurseries, and safe places for juveniles. These would be no-take zones, where fishing is not allowed and the habitat is protected from despoilment. Some coastal states have established such no-take zones. Their laws and regulations should be rigorously enforced. Similar systems should be established on the high seas where fishing pressures are extreme to ensure the continuation of the stock and thereby provide for the continuation of the industry.

The Marine Section of the IUCN's (World Conservation Union) World Commission on Protected Areas set up a special working group to advance the concept of protected areas in the high seas. I was appointed to lead the effort. The advisory committee recommended that the priority features for consideration should be seamounts, hydrothermal vents, and black smokers. The idea was to identify some specific sites that would merit careful scientific study to document the natural values and to identify the threats to those sites. These features were selected because of the extreme fishing pressure on seamounts (seamounts are extraordinarily rich in species) and because of the potential for exploitation of the mineral and biological resources of the vents.

Wilderness

Wilderness has a role in the marine environment. Definitions of wilderness on land usually rely on the absence of evidence of human intrusion, primarily roads. In the three-dimensional marine environment, wilderness could be defined as marine space without evidence of human activity. If large-scale industrial use begins, and if destructive fishing practices continue, the time will come when there will be little ocean space or biodiversity that is not suffering from human impact. Designating significant areas as wilderness follows the precautionary principle.

Yes, there is not only room for marine wilderness, there is need for it. Wilderness serves as a control by which the

condition of other similar features that are being utilized can be measured. It provides excellent undisturbed areas for benign research. Also, while recreation on the high seas seems difficult, some adventurous people are already paying large sums ($32,500 each) to be taken by submersible to view the remains of the Titanic.

During the Fourth World Wilderness Congress (WWC4), held in Colorado, U.S.A., in 1987, a 5-day seminar was held entitled "Ocean Wilderness." Discussion among participants from many countries was sponsored by WWC4 organizers, the IUCN, and the National Oceanic and Atmospheric Administration (NOAA, a U.S. government agency with responsibility for marine programs).

The Fourth World Wilderness Congress resolved that more should be done in coastal waters to develop systems of protected areas in marine environments within the waters of coastal states. It said that wilderness is an appropriate designation for certain pristine areas. I am proposing at this Congress a resolution to extend these concepts to the high seas.

A number of difficulties inhibit the development of an international system of Marine Protected Areas. First is the lack of appreciation by governments and by people who do not realize that the oceans are extremely valuable, they heavily influence weather, they are subject to present and future threats, and they are very poorly understood.

Next, at present there is no international body with clear authority to undertake the task. While there are a number of existing agencies, such as the International Maritime Organization, the United Nation's Educational, Scientific and Cultural Organization (UNESCO) Biosphere Reserves program, UNEP's (United Nations Environment Program) Regional Seas, and a number of agencies established by treaties, such as the United Nation's Convention on the Law of the Sea, and the Convention on Biological Diversity, none of them have been analyzed by international lawyers to determine if they could assume the authority required to set up such a program.

Third, there is a critical need for an extensive and coordinated research program on all aspects of the marine environment. We must hear from the scientists. So far, only exciting glimpses of the wealth of marine biota in the midwaters and on the seabed have been photographed. A relative handful of scientists venture down into the deep in the new technological wonders of submersibles. Tethered robots also can extend even deeper, taking photographs and gathering specimens. Nations must cooperate in marine research, preferably under the coordination of an international agency. We have known about chemosynthetic life at the hydrothermal vents for only 20 years. What wonders remain to be discovered?

Management

Assuming that an appropriate international agency can be identified or established, its duties would include coordinating research programs so that the complexities and functions of the marine world can be better understood. We need an inventory of what is there. Management regimes should be established. IUCN's World Commission on Protected Areas has established a system of six categories of protection. Originally developed for terrestrial areas, they now apply to marine areas as well. The categories range from areas warranting total protection to areas being managed for sustainable use. Category I includes wilderness. Characteristics of the natural features, size, location, and vulnerability to threats would guide the degree of protection to be afforded to candidate areas.

Monitoring and Enforcement

While monitoring activities in and under the high seas may seem like a formidable task, technological developments would facilitate it, such as satellite observation. The system of extremely sensitive listening devices installed on the seabed by the United States Navy, but now discontinued, could be utilized. Enforcement could be a project of the world's navies. Already the navies of France and Australia are enforcing some fisheries regulations in the Southern Ocean, while the United States Coast Guard is doing the same in the Northern Pacific.

Conclusion

Protecting areas on the high seas is an idea whose time has come. This new concept would benefit from your thinking and suggestions. I hope you will help.

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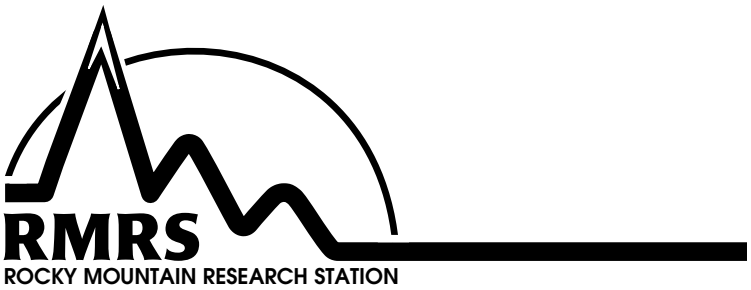

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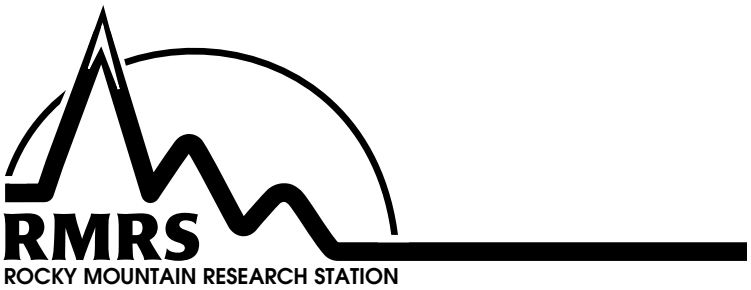

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