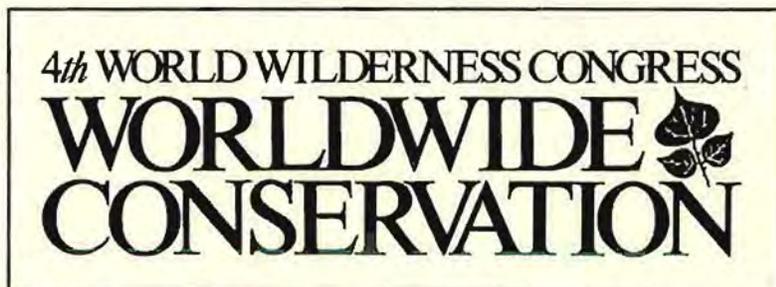


DESIGNATION AND MANAGEMENT OF PARK AND WILDERNESS RESERVES

Edited By

Edwin E. Krumpe and Paul D. Weingart



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INTERNATIONAL PERSPECTIVES ON MANAGEMENT OF PARK AND WILDERNESS RESERVES

EDWIN E. KRUMPE PAUL D. WEINGART

INTRODUCTION

The 4th World Wilderness Congress held in Colorado, U.S.A., September 11-18, 1987, provided an unprecedented opportunity for scientists, managers, and concerned citizens from around the world to meet and share scientific and philosophical ideas and information concerning world conservation. In the Symposium on Designation and Management of Park and Wilderness Reserves 54 participants took part in presenting 10 hours of technical sessions with 27 oral presentations and 27 poster presentations.

The symposium achieved an international representation with 12 presentors from foreign countries and 16 from the USA. All participants were chosen by a panel of experts based on the scientific and practical merit of their papers. Both those who made oral presentations and those who presented at the poster session were asked to prepare written papers for inclusion in this proceedings.

SUMMARY OF THE SYMPOSIUM ON DESIGNATION AND MANAGEMENT OF PARK AND WILDERNESS RESERVES

Let us approach the difficult task of summarizing so many scientific papers by highlighting some of the major concepts that emerged from the presentations and from the questions and comments from the audience throughout the four-day symposium.

1. We raised more questions than we answered. But it is gratifying to see how many scientists around the world are addressing the complex issues that affect the management of our park and wilderness reserves.

2. Wilderness and park preserves do not exist in a vacuum. Management decisions both inside and outside the boundaries impact the very health and existence of the protected areas we care so much about.

3. Science has played an important role in the identification and designation of wilderness and protected areas around the world. But key ecosystems and biogeographical regions still lack protection and time is running out.

4. Scientific principles are clearly needed to guide the management of protected areas if we are to sustain an enduring value for future generations. The 54 scientists who took part in our symposium clearly dispelled the myth that wilderness requires no management. Without proper management, it is practically inevitable that we will lose the natural wonders we so dearly want to endure for future generations.

5. The problems and threats to our parks and wildernesses are amazingly similar around the world—population pressures, agriculture, forestry, grazing, uncontrolled tourism, hydro power development, land invasion, exotic plants and animals, mineral extraction—and the list goes on.

6. Involving the public in both designation and management of park and wilderness is essential to the successful preservation of these valuable resources. Awareness and interest in forming partnerships between managers and citizen groups is emerging as an important force in many countries.

7. The concept of diversity is a key to understanding the value of our natural areas. Naturally functioning ecosystems which protect and perpetuate genetic diversity will provide yet untold benefits.

8. Our panelists identified a definite need for the highest level of legal protection if our wilderness resources are to endure.

9. Finally, and perhaps most importantly, we must never lose sight of the fact that as we manage and protect our park and wilderness reserves, future generations will be our judge. Mistakes in judgement or mismanagement could have irreversible consequences. Clearly, we must draw upon our best scientific expertise as we face a future full of peril and promise.

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Edwin E. Krumpe & Paul D. Weingart served as Co-chairmen of the Symposium on Designation and Management of Park and Wilderness Reserves.

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WILDERNESS AND PILGRIMAGE AS SOCIAL CRITICISM*

ALICE E. INGERSON

INTRODUCTION

Particularly in the developing world, but also in the West itself, social critics have suggested that the wilderness agenda of Thoreau and Muir is at best a diversion or at worst a subversion of urgent demands for economic and social equality. Such critics argue that wilderness advocates are trying to force the rest of the world into a mold invented by Romantic, Euro-American, middle-class males who were more interested in themselves than in the major social and political questions of the nineteenth and twentieth centuries. This paper asks whether wilderness appreciation would be less vulnerable to such charges if it were considered as a special subset of pilgrimage experiences, which are found over a much longer history and a much broader social range. Christian K. Zacher points out that "both the custom of going on pilgrimage and the analogy of life as a pilgrimage" have "roots in the nearly universal human belief—Buddhist, Greek, Jewish, Moslem—that certain spots of earth are sacred and that man must endure his passage through this world in order to achieve a better life hereafter" (1976: 43). Until relatively recently, most pilgrims endured discomfort and physical danger equal to or greater than that experienced by frontier explorers and wilderness enthusiasts. Like the more eloquent defenders of wilderness, moreover, pilgrims saw their travails as making them better human beings, allowing them to look back and down upon their everyday disappointments and ambitions with a new detachment.

*in Krumpal, E.E., & P.D. Weingart, eds. 1992. *Management of Park & Wilderness Reserves*. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

On the other hand, it is possible that the wilderness concept cannot be translated into other cultures without doing violence to those cultures, any more than Western religious missionaries could translate the Bible into non-Western languages without contributing to irreversible social changes among the people who lived through those languages. It is easy to conclude that Alaskan wilderness "means the same thing" to a Sierra Club hiker as a Himalayan shrine means to a Hindu pilgrim, if we ignore the vast social and historical differences between the two landscapes and the two people, but policy recommendations based on such intellectually lazy comparisons are very likely to backfire: when major differences appear, as they surely will, should the hiker be forced to conform to the pilgrim's habits, or vice versa? To the extent that cultural diversity is compatible with or even a requirement for natural diversity, environmentalists may have to revise their own notions of wilderness in response to critics from other cultures, rather than demand that the other cultures reshape themselves to Western ideals, however sacred or scientific.

WILDERNESS AND PILGRIMAGE, THE GROUNDS FOR COMPARISON

Both wilderness treks and religious pilgrimages have been described as arduous round-trip journeys to remote places, where the travelers do not settle but from which they return with fundamentally transformed views of themselves and sometimes with new social roles. For the purposes of this comparison, the most suggestive analysis of pilgrimage is that of Victor and Edith Turner in *Image and Pilgrimage in Christian Culture*. In that book, the Turners modify for Catholic pilgrimages in Western Europe an analytical scheme they originally applied to religious rituals among the

Central African Ndembu. That scheme characterizes everyday life as full of "structure," hierarchical and relatively inflexible relations of authority and obligation, but punctuated by moments of ritual "communitas" or "liminality," in which social barriers are lowered and the rigid division of labor gives way to playful role reversals. General occasions of communitas are rare in late-twentieth-century North America, but include Halloween for children and to some extent April Fool's Day for adults, on which behavior is sometimes tolerated that would be resented or even punished on other days.

The Turners argue that pilgrimage was and is such an occasion in Christian societies, an opportunity for the pilgrim to "get out, go forth, to a far holy place approved by all . . . away from the reiterated 'occasions of sin' which make up so much of the human experience of social structure," to face "fresh and unpredictable troubles" that offer "a release from the ingrown ills of home" (1978: 6-7). Pilgrims together experience communitas, relating to one another as a "thrang of similars," for whom "likeness of lot and intention is converted into commonness of feeling" (1978: 13).

The Turners themselves point out similarities between pilgrimage and other forms of escape from social constraint, including wilderness or nature tourism:

A tourist is half a pilgrim, if a pilgrim is half a tourist. Even when people bury themselves in anonymous crowds on beaches, they are seeking an almost sacred, often symbolic, mode of communitas, generally unavailable to them in the structured life of the office, the shop floor, or the mine. Even when intellectuals, Thoreau-like, seek the wilderness in personal solitude, they are seeking the material multiplicity of nature, a life source (1978: 20).

Both for individuals and for groups, some form of deliberate travel to a far place intimately associated with the deepest, most

cherished, axiomatic values of the traveler seems to be a 'cultural universal'. . . . Every year, millions visit national parks and forests . . . mostly, no doubt, for recreational reasons, but partly to renew love of land and country (1978: 240).

Many studies of wilderness perception and preservation have pointed out the similarly religious vocabulary of writers such as Thoreau and Muir. Roderick Nash, in *Wilderness and the American Mind*, quotes descriptions of wilderness areas as "meccas for a 'pilgrimage into our species' past'" and as "sanctuaries of reorientation" (1973: 253). Frederick Garber quotes from Thoreau's journal a description of mountains as "stepping-stones . . . by which to mount when we would commence our pilgrimage to heaven" (1977: 85). Mary Elkins Moller even uses the term "communitas" to describe the sense of community that Thoreau found in the mountains (1985: 95-96). Moller also claims that Thoreau was "attracted and comforted by another image . . . that of a true community . . . of self-reliant, idiosyncratic individuals . . . nurtured by familiar association and mutual respect" (1985: 89-90), an image that might almost be quoted from Victor Turner's definition of communitas as "a relationship between concrete, historical, idiosyncratic individuals" (1969: 131-32). A similar sense of community based on the "freedom of thought inherent in . . . liminality" described by the Turners (1978: 3) appears in one of George Marshall's descriptions of his brother Robert: "Bob found in both the wilderness and the frontier community some of the . . . freedom of the human spirit for which he fought and which seemed so lacking in the twentieth-century world" (as quoted in Glover 1986: 259).

Several studies have documented John Muir's even more explicitly religious attitude toward wilderness. Linne Marsh Wolfe quotes Muir's statement that wilderness provided "places to play in and pray in, where Nature may heal and cheer and give strength to body and soul alike" (1945: 188). Michael Cohen highlights Muir's religious language: Muir "had been visiting sacred places" (1984: 61);

"Muir's experience on [Mount] Ritter is the wilderness experience par excellence. . . . It is primarily a religious conversion" (1984: 75); Muir "substituted the Spirit of Wilderness—the Spirit of Nature—for the Spirit of Christ in the Biblical text" (1984: 126-27). Even if such sentiments are more properly attributed to Cohen himself than to Muir, they suggest that it is appropriate to compare the historical experience of pilgrimage with the Romantic experience of wilderness.

Finally, Cohen's metaphor of the "pathless way" ties closely into the Turners' analysis of liminality. Cohen describes Muir as deciding consciously "not to fix himself in the landscape. . . . He sauntered through the flow" (1984: 149). In one sense pathless wandering seems the antithesis of following a pilgrim road. Yet the Turners applied the same term, "flow," to pilgrimages after borrowing it from psychologist M. Csikszentmihalyi, who had applied it to rock climbing. He defines "flow" as resulting from "concentration on a limited stimulus field," using one's "own skills to meet clear demands," and "transcending ego boundaries" (quoted by the Turners 1978: 137-39). The concept of "flow" in all three discussions embodies an implicit critique of the rigid structure and social rules of everyday life, from which both the wilderness climber and the pilgrim seek release.

The close correspondence between the Turners' analysis of pilgrimage and the language of North American wilderness advocates suggests that a general concept of "liminal" areas, destinations for travelers willing to endure hardship in the pursuit of "communitas," could be used to translate the North American Romantic concept of wilderness into other cultures. Wilderness hikers and pilgrims may travel to very different kinds of places, but they apparently have sought to escape from many of the same problems: social hierarchy and privilege, shallow materialism and physical comfort, uncritical acceptance of the status quo. From this point of view, the incorporation of historical pilgrimage sites into new national parks makes logical as well as practical sense. Such sites may already have been "functional wilderness," offering to people around the world the experience of "flow" and freedom from

social constraints that Thoreau, Muir, and Marshall sought in the North American wilderness. If closer study bears out the comparison, then North American environmentalists might successfully defend themselves from charges of ethnocentrism and historical amnesia by championing the preservation of sacred places outside North America.

THE GAP BETWEEN SOCIAL CRITICISM AND SOCIAL CHANGE

Closer study, however, complicates that convenient comparison. In particular, it is not clear that the social criticism implicit in ideals of wilderness and pilgrimage can lead to anything more radical than temporary social reversal or escape for a few individuals. The Turners' concept of pilgrimage seems to provide one valid translation for the wilderness concept. But that translation does not in itself demonstrate that either pilgrimage routes or wilderness should be given high priority during the pursuit of economic and social equality, rather than postponed as luxuries to be considered only "after the revolution."

The Turners' analysis never really bridges the gap between social criticism and social transformation. On the one hand, Victor Turner originally defined *communitas* as necessarily temporary, something that "cannot stand alone if the material and organizational needs of human beings are to be adequately met" (1969: 129). On the other hand, the Turners insist that *communitas* could be permanent, that pilgrimage "serves not so much to maintain society's status quo as to recollect, and even to presage . . . a world where *communitas*, rather than a bureaucratic social structure, is preeminent" (1978: 39). They explain that the original notion of *communitas* as fleeting was true for non-Western or "tribal societies" but not for the "open-ended" Western or complex societies that harbor the world's major pilgrimage traditions:

Liminality is now seen to apply to all phases of decisive cultural change, in which previous orderings of thought and behavior are subject to revision and criticism. . . . In the

liminality of tribal societies, traditional authority nips radical deviation in the bud. We find there symbolic inversion . . . we do not find open-endedness, the possibility that the freedom of thought inherent in the very principle of liminality could lead to major reformulation of the social structure (Turners 1978: 2-3).

Yet it is difficult to find concrete historical examples in which the pursuit of *communitas* through pilgrimage led to such lasting social change. The Turners themselves acknowledge that Western religious leaders have often followed the same course as tribal elders, nipping social radicalism in the bud and seeing pilgrimage as "too democratic, not sufficiently hierarchical." As a result, the "early stages" of most pilgrimages, which were "inveterately populist, anarchical, even anticlerical" (1978: 31-32), eventually gave way to an emphasis on "salvation or release from . . . the structural world" (1978: 8-9) rather than transformation of it.

The Turners never resolve this ambiguity in their analysis of pilgrimage and social change. Have all pilgrimages lost their socially critical edge, because *communitas* inevitably turns into "bureaucratic social structure" if asked to meet "the material and organizational needs of human beings," or have established bureaucracies blunted the critical edge of some pilgrimages but not others? The difference between these two possible answers is crucial for the analogy between wilderness and pilgrimage, particularly for deciding whether the wilderness concept is inevitably or only accidentally elitist or conservative. The first answer implies that the social criticism implied by sacred journeys outside the social structure can never really help to change that structure. The second answer suggests that implicit criticism can lead to social change under at least some historical circumstances.

Many writers on wilderness have found the first answer to the question raised above to be unproblematic; for them, a sacred journey, whether to a mountaintop or a pilgrimage

shrine, could and should provide only temporary release and regeneration for the few. The 1974 Wilderness Act in the United States, for example, defined wilderness as something like Victor Turner's original fleeting *communitas*, "where man himself is a visitor who does not remain," a temporary relief from and not a permanent alternative to urban, industrial society. Michael Cohen concludes that "Muir's religion is by its very nature a solitary one. . . . It may be that there can be no church of the wilderness. Perhaps there can never be more than one worshipper, since two people create a society" (1984: 150). Olaua Murie similarly insisted that protecting the wilderness required closing it to all but a small elite and opposing Bob Marshall's proposal that the Wilderness Society actively seek blue collar members (1940: 18).

Paul Bernard's history of the Swiss Alps documents exactly the kind of undermining feared by Cohen and Murie, in which the sense of *communitas* evaporated as the mountains attracted larger crowds of pilgrims, and new kinds of pilgrims:

[Once] the mountain vacation established itself as . . . accessible [to more than] the very rich, it was . . . radically transformed. What had fallen by the wayside was the original notion of the vacation as a suspension of ordinary activity, a time of regeneration, of reestablishment of contact with nature not changed beyond recognition by the work of men. . . . The mountain vacation[']s inner dynamic had been transformed into a copy and evocation of urban life even before the First World War, [and] after the Second [it] was taking place in a setting that had come to have an uncanny resemblance to the city (1978: 168, 178).

Bernard also points out something never made explicit in Cohen's and Murie's arguments: that although the defenders of wilderness often saw it as an escape from class hierarchy, such hierarchy very much persisted in real historical experiences of both wilderness

and pilgrimage. Bernard reminds us, for example, that Swiss mountaineering was a bastion of social privilege until the turn of the twentieth century, when "educational campaigns" were launched "to awaken nature loving among the masses" (1978: 177). In response to the success of these campaigns, he reports, one Swiss tourist association insisted in 1900 that "ways must be found to compensate people of quality for having to suffer the presence of the disgusting masses" (1978: 178).

The Turners' description of the pilgrimage promises an even more explicit sense of social equality than do most writers on wilderness. Yet there is just as wide a gap between the theory of *communitas* and the concrete history of popular pilgrimages as between Cohen's or Murie's wilderness solitude and Bernard's description of Alpine tourism. Pilgrimages that attracted large numbers of people, particularly peasants and workers, were often raucous rituals of social and sexual reversal. Middle-class religious reformers have often sounded like the Swiss tourist association quoted above as they attempted, with limited success, to convince such pilgrims to spend more time meditating and less time dancing and drinking.

The Catholic Church hierarchy in the late Middle Ages, for example, eventually forbade clerics to go on pilgrimages because they had become more like the trip described in Chaucer's *Canterbury Tales* than like the pilgrimages described by Victor and Edith Turner. Christian Zacher reports that Saint Thomas Aquinas energetically condemned fourteenth-century pilgrimages as occasions for "gossip and sexual promiscuity . . . excessive eating and drinking, the flaunting of fancy dress, the abuse of indulgences, . . . and above all . . . tale telling" (1976: 54). A pilgrimage in the southern French (heretical) village of Montailou in the same century, according to Emmanuel Le Roy Ladurie, "was regarded as so natural [and so unsacred] that a wife running away from her husband could throw off her pursuers by saying, I am going with my brother on a pilgrimage to Romania" (1979: 313-14).

In the case I know best, rural parishioners in Portugal openly opposed their government

and their parish priests in the mid-twentieth century, when both tried to force popular pilgrimages to conform to middle-class ideals of spiritual dignity. Joyce Riegelhaupt reports a local priest's remark that he felt "like a missionary to these pagan people" and their villagers' retorts that "the priests are ending religion" in trying to outlaw dances and other "less spiritual" activities during traditional religious *festas* in the 1960s (1973: 835). Moises Espirito Santo explains that "the festivals that take place in the popular sanctuaries are called *romarias* . . . and are completely distinct from those that the Church organizes in the sanctuaries under its control. . . . In the colorful language of the countryside, a *romaria* is a noisy crowd, a disorderly parade, an occasion of debauchery and loud arguments" (n.d.: 139). And Pierre Sanchis documented the only partly successful efforts of the Salazar dictatorship to "impose solemnity . . . forbid dancing, control violence, [and] create a hierarchical, orderly, and purely sacred realm" in place of the popular *romarias*, by fining and sometimes jailing their participants (1983: 183). Sanchis also suggests that the official Catholic pilgrimage to Fatima, established in the 1920s, enjoyed unusually rapid and enthusiastic support from the Church hierarchy and the government, because both saw the new shrine as a "kind of counter-romaria" they could use to "teach the people how to have [truly] Catholic festivals" (1983: 201). In short, when the bureaucracy could not restrain the exuberance of existing pilgrimages, it attempted to replace them with one of its own making.

Many wilderness enthusiasts would probably feel more at home in an official "Catholic" pilgrimage like the one to Fatima than on the popular pilgrimages described above, which often were to spiritual contemplation what crowded trailer camps and generator-powered television sets are to solitary hikes. But if the wilderness experience can only be likened to a middle-class experience of pilgrimage, in which the pious must find ways to "compensate for the presence of the disgusting masses," then the analogy between wilderness and pilgrimage is unlikely to help the wilderness concept cross class or cultural barriers.

Even an expanded analogy between wilderness and pilgrimage, however, an analogy that included the more "populist," "anarchical", or even "anticlerical" pilgrimages, might make little headway against the charge that wilderness preservation is a fundamentally conservative political priority. Few anthropologists or social historians have argued that even the noisiest or most disrespectful forms of ritual reversal have actually transformed the social status quo; most of their conclusions sound more like the Turners' original idea that *communitas* is a means of escape rather than of social reconstruction. Keith Thomas, for example, interprets "the carnival [as] a prepolitical safety valve for the members of a structured, hierarchical society [emphasis added]" (paraphrased in Davis 1975: 103). Natalie Zemon Davis herself sees an "enormous scope [for] mockery and derision" (1975: 107) in the popular "misrule" at festivals in sixteenth-century France, which could "suggest alternatives to the existing order" (1975: 123), "loosen the rigors of a structured society and . . . 'infuse' through the system at least temporarily the values of an egalitarian community" (referring to Mikhail Bakhtin's analysis of Rabelais, Davis 1975: 103). In the end, however, she concludes that such rituals were "not rebellious" (1975: 107) and tended "to reinforce order" (1975: 123). Max Gluckman offers examples from the British army, Greek myth, and Zulu society of "rites of reversal [that] obviously include a protest against the established order" but "are intended to preserve and even to strengthen the [same] established order" (1956: 109). E. P. Thompson acknowledges that some working class utopians in the eighteenth and nineteenth centuries found inspiration for social rebellion in *Pilgrim's Progress*, but that the same text also encouraged "temporal submissiveness" and "the egocentric pursuit of personal salvation" (1966: 31, 34, 392).

Such two-sided interpretations of popular pilgrimages, like the Turners' two-sided view of pilgrimage, have an intricate chain of implications for the comparison between wilderness and pilgrimage and therefore for the translation of the wilderness concept across

cultures and classes. Certainly both wilderness and pilgrimage offer some temporary escape from social hierarchy. Yet those forms of pilgrimage that most resemble the Romantic notion of wilderness share with Romanticism a certain class bias. Even a wilderness experience that incorporated more popular or rebellious social behavior, however, would still bear an uncertain relationship to radical social transformation. In other words, even a cross-cultural and cross-class analogy between pilgrimage and wilderness might still be, as suggested in the introduction to this paper, "at best a diversion or at worst a subversion of urgent demands for economic and social equality."

FROM SACRED JOURNEYS TO PROFANE HISTORY

Determining the range of possible relationships between wilderness preservation and social transformation requires going beyond theoretical analogies to explore the concrete history that includes both religious pilgrimage and wilderness preservation—the history of tourism. Few historians of either environmentalism or religion have taken the literature on tourism seriously, perhaps because we can identify wholeheartedly with natural grandeur and pious pilgrims but wish to distance ourselves from frivolous or insensitive tourists. Yet that choice can be a serious analytical mistake. It encourages us to duck fundamental questions about the causes and consequences of both pilgrimage and wilderness preservation that can only be answered by detailed historical research: To what extent, and in what circumstances, has religious, environmental, or any other kind of travel benefited the visited peoples and landscapes? Who has held the real power to define what counts as a benefit in such cases?

Middle-class and Romantic descriptions of pilgrimage and wilderness usually focus on the transformation of the visitor who confronts an unfamiliar but essentially stable environment. The history of tourism, however, reveals precisely the opposite—visitors who appear to have changed little in themselves but have fundamentally transformed the peoples and

landscapes they visited into commodities called "local color" and "scenery." Only historical research can determine whether the published accounts of this process are (1) inaccurate, reflecting mostly invalid assumptions made by writers who were not sensitive to the possibilities of *communitas* and liminality, or (2) essentially accurate, requiring us to admit that neither pilgrimage nor wilderness preservation is likely to lead very directly to a "world where *communitas*, rather than a bureaucratic social structure, is preeminent."

The Golden Hordes: International Tourism and the Pleasure Periphery, by Louise Turner and John Ash, is a useful counterbalance to utopian visions of both pilgrimage and wilderness. Turner and Ash acknowledge that at first glance, "tourism [seems] to have subversive potential" because it gives tourists "a position from which it becomes possible to see the inadequacies of [their] own society more sharply" (1976: 49). Yet like the subversive potential of ritual reversals or liminality in pilgrimages, the subversive potential of tourism is seldom realized. The "Cult of Nature," Turner and Ash point out, is often "a way of avoiding responsibility; our frayed, alienated psyches cannot support the weight of civilization, which (it is implied) *we have inherited through no fault of our own*" (emphasis by the authors, 1976: 150). In other words, the tourist or pilgrim may dislike social hierarchy enough to flee from it into the wilderness or down the pilgrimage road, but he seldom takes on the difficult and dangerous work of learning what created that hierarchy or of acting effectively to change it:

average tourists . . . cannot, or will not, see any causal link between the wealth of their class and the prevailing poverty of the countries they visit. . . . To suggest that a specific historical process might have played a part in establishing this opposition involves talking in terms of capitalism and imperialism and could, therefore, be dismissed by them as the clichés of communist doctrine (Turner and Ash 1976: 291).

Environmental tourists adopt a similar attitude when they see wilderness reserves as natural landscapes and refuse to admit that "the creation of the reserves themselves has already upset . . . the balance of nature" (Turner and Ash 1976: 176-77).

Of course the analysis of Turner and Ash may not apply to all tourists at all times, any more than the analysis of Victor and Edith Turner applies to all pilgrims or the language of John Muir applies to all lovers of wilderness. More specific research, which seeks out the causal connections between the history of visited peoples or landscapes and the internal history of the societies that generated their visitors, is the only way to determine the accuracy and range of such general visions. As long as governments, historians, and tourists themselves—whether pilgrims or wilderness hikers—separate these two histories, however, *communitas* and "sauntering through the flow" will be limited to those wearing economic and social blinders.

Note: With few exceptions the proceeding paper, which represents the first step and background for a research project on the history of nature tourism and popular pilgrimage in northwestern Portugal (the Gerez Mountains), is based on examples from North America and Western Europe. In future drafts I hope to add material from Moslem pilgrimages in North and West Africa, Hindu pilgrimages in India, and Buddhist pilgrimages in South and Southeast Asia. I welcome comments, especially about sources for non-European examples, whether or not they support the argument made here.

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THE CASE FOR UNDERGROUND WILDERNESS*

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THE VALUES IN WILDERNESS

The values we seek in wilderness are well recognized by many authors. Roderick Nash's book, "The American Environment" (1976), details the values of the natural world, as enumerated by The Conservation Foundation; this list includes material use, beauty, spiritual-symbolic, recreation, and knowledge. Hendee and others (1978) categorize wilderness values as experiential, mental and moral restoration, and scientific. Other listings of general wilderness values are similar (Hendee and others 1968; Lucas in Hendee and others 1978). Rolston (1985) compiles the above lists into a detailed itemization of twelve wilderness values. Not surprisingly, all of the lists, although written by various authors reflect similar themes.

Caves share many of these values with surface wildernesses. A number of authors (White 1976; Zuber 1977; Huppert 1979; Gamble 1981; Kiernan 1984; Glover 1985) enumerate the specific values of caves. Some of the more obvious values associated with caves are henceforth explained.

SCIENTIFIC VALUE

Poulson and White (1969) have probably written the most complete record of the scientific values of caves. To them caves are excellent ecological, evolutionary, and mineralogical laboratories. Hill and Forti,

*in Krumpal, E.E. and P.D. Weingart, eds. 1992. Management of Park and Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

in "Cave Minerals of the World" (1986), highlight the usual and unusual mineral specimens found in the cave environment.

Culver's "Cave Life: Evolution and Ecology" (1982), presents great detail on the biological values of caves. The unusual life forms that frequent some caves add to the diversity of the global gene pool. There may be as yet unknown biologic resources in cave ecosystems, as is suggested by the discovery every year of new spelean species. These resources may only be preserved in the pristine natural cave ecosystem. Numerous cave-associated organisms are already on the U.S. list of endangered and threatened species.

Many caves provide suitable conditions for deposition and preservation of paleontological and archaeological materials. If the remains are undisturbed they can offer a wealth of information on past ecological and human associations. Not only have primary fossils been found in caves but fascinating trace fossils have also been discovered. Panther tracks in a Missouri cave are estimated to be over twelve thousand years old. The Mammoth Cave area in Kentucky and central Indiana has yielded up very well preserved mummified remains of humans, as well as prehistoric footprints in the soft silt along frequented trails through parts of the cave. These fossils have been of great value in determining the lifestyles, habits, and ailments of prehistoric Americans (Watson 1969; 1974).

Caves can also furnish information on local and regional ground water systems. They are a unique way to get an 'inside view' of these systems, and they sometimes

provide unusual but valuable access for sampling of such water. Unfortunately that ready access also allows the ground water to be easily polluted, primarily because of the direct links of surface waters to ground water in karst terranes, which are geological regions where caves are prolific. Examples of ground water pollution from surface activities in cave areas include agricultural chemicals and eroded sediment that is intercepted by the ground water via pirated surface runoff. More localized pollution includes the effluent derived from toxic spills, landfills, deliberate deposits of refuse in sinkholes, leaking domestic septic systems, or leaking underground storage tanks, which can be delivered to ground water via sinkholes, cave entrances, bedrock fractures, or sinking streams in karst regions (St. Ores and others 1982; Hallberg and others 1985). Therefore, an excellent reason for protecting caves and their surrounding watersheds as wilderness is the concomitant protection of the ground water quality.

Caves, protected as wilderness, can provide baseline environments against which other environments can be measured. This may ultimately prove to be their greatest scientific value because pristine environments for baseline data are rapidly disappearing throughout the world.

RECREATIONAL VALUE

Rolston (1985, p. 27) notes two positive recreational values of wildlands as: "(a) to see what we can do (activity) and (b) to be let in on nature's show (contemplation)." There is no denying that many caves can offer a challenge to body and spirit. This is attested to by more than 7,000 active members of the National Speleological Society and an increasing number of spelunking articles in popular outdoor and environmental magazines, and even in scientific journals (Bolton 1987). This interest will have to be tempered with conservation education in order to bring about an appreciation for the fragility of the cave environment within the user and the general public. This is being done, to varying degrees, by the National Speleological Society, the American Cave Conservation Association, and other environmental and

government agencies. Unfortunately this message often does not reach casual 'Sunday' visitors to an undeveloped cave. Access controls, whether voluntary or physical, may be needed so as to avoid exceeding the carrying capacity or the limits of acceptable change for any individual cave. Of course, an inventory of spelean resources and a detailed management plan will be needed for each proposed underground wilderness.

ESTHETIC/RELIGIOUS VALUE

Anyone who has visited even a few of the great commercial caves of the world can speak highly of their beauty. The nearly two centuries of operation of Mammoth Cave, Kentucky as a tourist attraction is evidence of the lasting fascination that people have with the beauty and mystery of caves. Moreover, some commercial caves in other parts of the world have been in operation for much longer periods of time.

The vista of a large cave room, a glittering formation, an underground cascade, a deep, still lake, or the isolation of having traveled underground for many hours from the cave entrance can generate the same emotions of awe as any surface wilderness.

HISTORICAL VALUE

Rolston (1985, p. 29) states that places of historical value provide "a lingering echo of what we once were, a way we once passed." Caves contain many historic relics. Notable examples in the United States include the huts built for consumptives in Mammoth Cave, Kentucky and the saltpeter workings in many caves in the southeastern part of the country. Caves were also used as hiding places for escaping slaves along the 'underground railroad' prior to and during the Civil War. Additionally, Jesse James' infamous gang of outlaws seem to have bunked in more than their share of caves.

These are but a few of the intrinsic values of caves. They do, however, demonstrate that

caves can fulfill the criteria requisite of a wilderness area.

LEGAL DESIGNATION OF CAVES AS WILDERNESS IN THE U.S.

Underground wilderness as a concept in the United States has been formalized in the work of various authors (Smith 1961; Watson 1967; Watson and Smith 1971; White 1976; Stitt and Bishop 1972; Smith and Watson 1979; Huppert and Wheeler 1986; Huppert 1986). The strictures of the 1964 Wilderness Act (P.L. 88-577) and the 1975 Eastern Wilderness Act (P.L. 93-622) define the criteria for areas to be selected for inclusion into the National Wilderness Preservation System. The criteria can be equally applied to caves as to surface lands. From Section 2.(c) of the 1964 Wilderness Act, those strictures are as follows:

"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; (4) may also contain ecological, geological, or other features of scientific, educational, scenic or historical value."

The 1975 Eastern Wilderness Act is similar in nature but it was specifically written for federal lands east of the 100th meridian. These lands may not meet the high standards of quality required by the earlier Act.

There seems little doubt that caves are eligible for and deserve inclusion in the National Wilderness Preservation System. Eloquent testimony recently presented to the Subcommittee on National Parks and Public Lands of the United States House of Representatives supports that contention. The testimony (Stevens 1987; Thornton 1987) was given to urge Congress to pass the proposed Federal Cave Resources Protection Act. In their presentations, Stevens and Thornton describe caves as unique places and essentially non-renewable resources. On the darker side of their testimony they both also describe the many difficulties of a large government bureaucracy trying to manage a poorly known and often misinterpreted resource with little or no funding. They also point to the confusion of regulations and laws, many of which are not directly applicable to caves, that managers of the parks and public lands may be required to follow, even where such requirements may be inappropriate, or even worse, detrimental to the cave ecosystem! Difficulties of communication between and within agencies and often conflicting management goals complicate the situation, even for the most determined federal employee with an interest in caves. In spite of these obstacles, there have been a number of successful federal cave management plans. Nevertheless, the majority of caves located on federal lands suffer to some degree from these management problems. These problems beg for a unified federal law for the protection of caves and their resources. The proposed Federal Cave Resources Protection Act would be a great step toward that goal. At the same time some of the more spectacular wilderness-quality caves under federal stewardship deserve additional protection as congressionally mandated wildernesses. Although there are many others, Huppert (1986) briefly describes and defends ten potential candidates for selection as cave wildernesses in the United States. (These are illustrated in Figure 1.)

FUTURE DIRECTIONS

With over 88 million acres currently protected by incorporation into the National Wilderness Preservation System (NWPS)

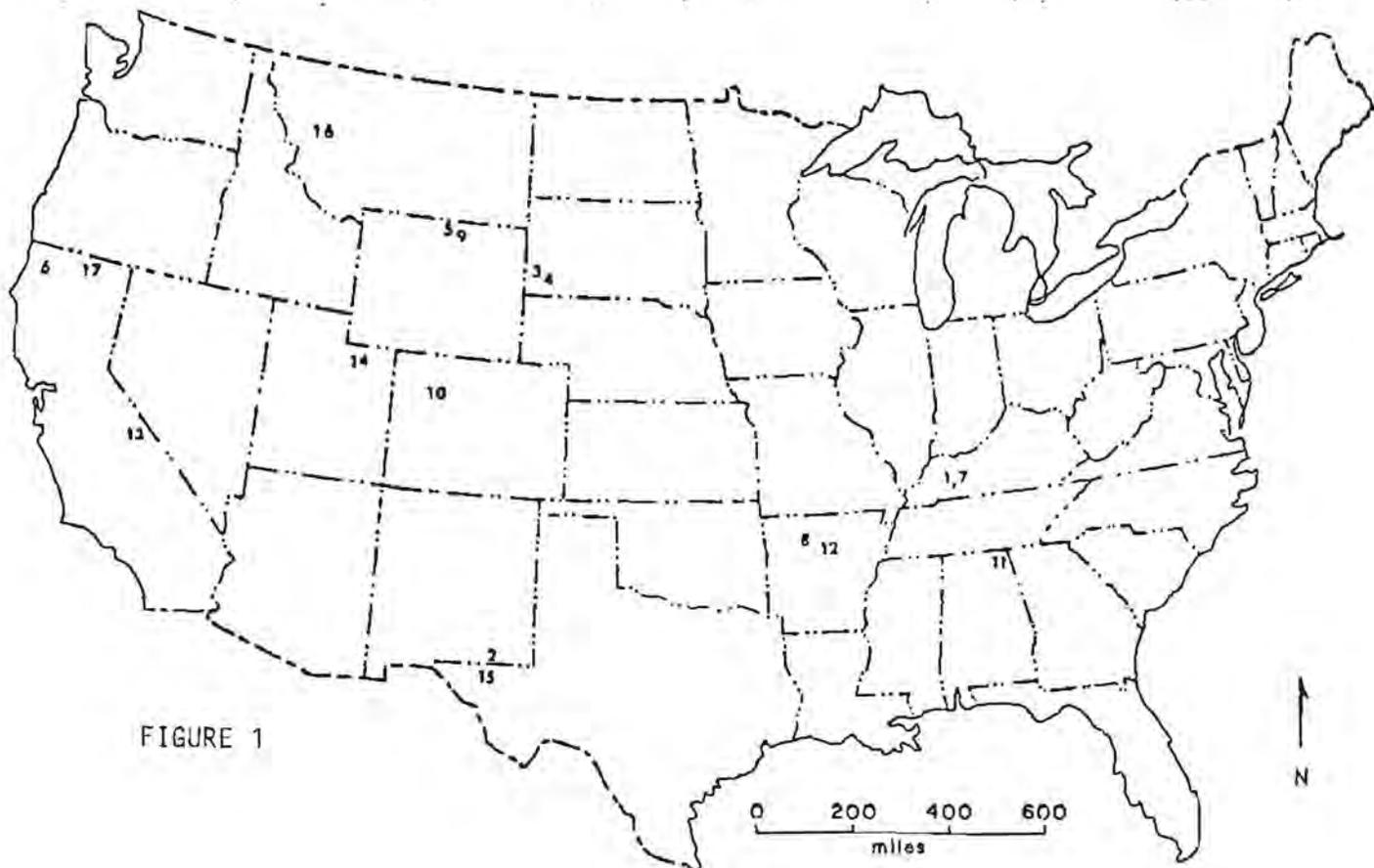


FIGURE 1

SOME POTENTIAL CANDIDATES FOR DESIGNATION FOR UNDERGROUND WILDERNESS

1. MAMMOTH-FLINT RIDGE SYSTEM, KENTUCKY
2. CARLSBAD CAVERNS, NEW MEXICO
3. JEWEL CAVE, SOUTH DAKOTA
4. WIND CAVE, SOUTH DAKOTA
5. BIG HORN-HORSESHOE SYSTEM, MONTANA-WYOMING
6. BIGFOOT-MEATGRINDER SYSTEM, CALIFORNIA
7. WHIGPISTLE CAVE, KENTUCKY
8. FITTON (BEAUTY) CAVE, ARKANSAS
9. GREAT EXPECTATIONS CAVE, WYOMING
10. GROANING CAVE, COLORADO
11. RUSSELL CAVE, ALABAMA
12. BLANCHARD SPRINGS CAVERNS, ARKANSAS
13. LILBURN CAVE, CALIFORNIA
14. BIG BRUSH CREEK CAVE, UTAH
15. CAVES OF THE GUADALUPE MOUNTAINS
16. CAVES OF THE BOB MARSHALL WILDERNESS
17. CAVES IN LAVA BEDS NATIONAL MONUMENT

MANY OF THESE CAVES ARE BEING MANAGED AS WILDERNESS AREAS. SOME ARE WITHIN DESIGNATED SURFACE WILDERNESS AREAS. HOWEVER, NONE OF THEM HAS BEEN DESIGNATED AS A FORMAL WILDERNESS IN ITS OWN RIGHT. WILDERNESS DESIGNATION WOULD BE THE ULTIMATE PROTECTION FOR FEDERALLY MANAGED CAVES. THE CAVES LISTED ABOVE ARE ONLY A SMALL NUMBER OF SUITABLE WILDERNESS CAVES MANAGED BY THE FEDERAL GOVERNMENT OF THE UNITED STATES.

(Krumpe and McLaughlin 1987), it would seem that wilderness lands in the United States are, in general, quite adequately protected. The groundswell of public opinion which has demanded these protections has, indeed, made monumental achievements toward preserving wildlands in the United States. However, now is not the time to rest on our laurels. The protections for wilderness in the U.S. neither guarantee flawless administration of areas so designated, nor include all significant areas which have "ecological, geological, or other features of scientific, educational, scenic, or historical value" (Wilderness Act of 1964) and that deserve to be protected for future generations. In fact, as emphasized by Stankey (1987), only about 100 of the 233 ecosystems in the U.S. are represented within the scope of the NWPS. Although a number of caves happen to occur on public lands currently within the NWPS, no specific cave is designated as wilderness. It is time that some examples of the unique ecosystems and habitats provided by caves be recognized for their unique values. Additionally, the designation of underground wilderness would be another step toward the goal of complete representation of all wild ecosystems within the NWPS.

In most cases, management of the cave(s) which incidentally occur on protected public lands takes a lower priority than surface land management, and in some cases the caves are either ignored or viewed disdainfully as a potential liability! The management problems identified earlier which specifically related to caves (Stevens 1987; Thornton 1987) include such issues as: lack of management expertise; lack of will on the part of managers to protect the fragile ecosystem (i.e., the cave) where choices conflict with other interests, such as grazing or recreation; lack of interagency coordination and consistency, even to the point of interagency conflicts, in goals and communication; problems of overuse and exceeded carrying capacities; lack of education and training programs for managers; lack of education of the public; and, finally, the lack of basic expertise on the ecosystem. Such problems are not unique to cave management; indeed, this list includes the five broad categories of issues identified at the 1983

National Wilderness Management Workshop (Krumpe and McLaughlin 1987). Conflicting management goals, especially where a variety of ecosystems exist within a single wilderness, can lead to management choices which are not necessarily the best, or perhaps not even good, choices for all ecosystems represented. Thus we see that many management problems are really universal to all wildernesses.

Progress is being made, however, in the realm of cave management. Both the Bureau of Land Management and the U.S. Forest Service have or will soon be enacting guidelines for cave management. Over the past three years, five National Cave Management Training Seminars have been held around the country by the American Cave Conservation Association. These workshops are specifically aimed at professionals in the government who may have caves under their jurisdiction. There have been seven National Cave Management Symposia since 1975, and at least five regional symposia. The training seminars are offered on demand, and the management symposia occur about every two years. The next management symposium is scheduled for October, 1987 in Rapid City, South Dakota. These meetings have given agency personnel and other cave managers the opportunity to share ideas and methods, and a beginning toward establishing communication networks.

The real challenge ahead is to convince the general public of the value of caves. The National Speleological Society, the American Cave Conservation Association, Bat Conservation International, the National Caves Association, the Nature Conservancy, and, to a lesser degree, other conservation organizations and many individuals have all made great efforts to inform and educate the public. These efforts will be greatly enhanced if Congress designates an underground wilderness.

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ROADLESS AREAS AS OUR MOST PRODUCTIVE RESOURCE*

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What a difference it would make to national and international policy if the preservation or encouragement of wilderness or wilderness-like characteristics came to be seen by decision makers as the most, rather than the least, economically profitable form of land management! The following points reflect the possibility for change in worldwide perceptions of and expectations for wilderness: from low value, diminishing, "locked-up" reserves to expanding resources with truly superior potential.

THE PROBLEM, BRIEFLY

Mechanized agriculture and domestic animal ranching have produced impressive, but transient, crop and meat surpluses. These surpluses have come at the cumulative loss of more than one-third of America's topsoil; they continue to require massive economic subsidies; and despite man's best efforts in chemical fertilization, the stored soil nutrients from the prairies which preceded our farms are still being drawn down for current agricultural production. The in-soil nitrogen supply is nearing its end in many critical areas. At the same time, other massive chemical inputs have not reduced the rate of crop loss from either disease or pests. Overall soil erosion continues to increase. Ground compaction from the operation of ever-heavier machinery makes the remaining soil less useful. These problems are magnified in the developing world, where they are linked with a long litany of other environmental, social, and political concerns.

Despite an increasing public awareness of these issues, it remains a nearly universal

perception that row crops and domesticated livestock are the most economically productive use of the earth. Wilderness is therefore given a grudging acceptance, if it is located in out-of-the-way corners, as a nice idea for recreation and maybe for science, but always as a replaceable form of land use if the need for food, fiber, or minerals seems pressing enough.

AN ALTERNATIVE HYPOTHESIS

Land management to preserve or encourage a site's wilderness qualities has the potential to play a major role in reversing the negative trends associated with mechanized agriculture. Management for wilderness character can actually increase the sustainable, economically useful output from our lands. It has a critical role for the most heavily used sites, as well as the least inhabited ones. This economic advantage may seem a surprising addition to the well-known aesthetic, recreational, and scientific utilities of land with wilderness character, but it has an impressive body of support. It offers an unexpected bonus of hope to wilderness lovers, and to those concerned with the future of our food, fiber, water, and clean air supply.

Direct, perceivable, economic utility is virtually the only argument which will allow for a continuing expansion of areas with wilderness character in a world with ever-increasing human numbers.

An increase in the amount of land committed to wilderness, by the addition of new tracts which would operate in an economically useful mode, does not preclude the continuation of wilderness areas set aside for research or pure recreation. Affirming that there are immediate gains to be had from lands with wilderness qualities does not negate the hard work of generations of preservation advocates. However, economic productivity which

*in Krumpe, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

preserves the wilderness character of the land would permit us to have far larger blocks of land that have the look and feel of wilderness than is possible through the simple preservation of "untouched" wilderness areas.

A critical caveat is that the ideas regarding the economic potential of wilderness areas which are expressed here should not be expected to free the environmentalist community from watchfulness. There is a danger that these hope-filled ideas can be misapplied through all-too-familiar forms of exploitation that are disrespectful to the land.

WHAT DO WE MEAN BY WILDERNESS, ANYWAY?

A site with wilderness character can be defined as land having maximal biological diversity within its climatic and other natural limits. This requires dominance by native plants and animals, minimized mechanized intrusion, and careful attention to the recycling of nutrients. It does not preclude the addition of nutrients geologically missing from a site, nor management which adds to the land's diversity, nor the harvest of its surplus products for human use (subject to their nutrient value being returned to the originating land). It also does not imply a static system, or one in pure ecological climax.

EVIDENCE IN SUPPORT OF DIRECT ECONOMIC UTILITY FOR WILDERNESS

The diversity associated with management for wilderness character allows an increase of 20% (or more) in meat and fiber output over any other management strategy for that land, whether in a low or a high productivity area. The longer the time period measured, the greater the advantage. A complete productivity measurement must include all possible outputs from the land, such as meat, fur, timber, fruit, and fuel. At its fairest, it should also include some weighting factors. For instance, since hardwood takes longer to grow, but has more strength than softwood, it may be assigned a greater value, as a pound of pecans is over a pound of corn in agriculture.

The productivity increase inherent in land managed for wilderness character over other land use is partially a result of the vegetation's more efficient use of sunlight and water as these two resources vary through the year and over the years. Multiple species of plants can respond to climate and weather in ways no single crop can hope to accomplish. The simplest form of proof for this is to fly over the country at any time other than the peak growth period for row crops. In May, plowed lands still look barren, while neighboring mixed prairie grasslands are already producing seed. In winter, only nature (and a bit of winter wheat) is photosynthesizing. Even with peak conditions, a single crop can equal but not exceed the productivity of a mixed system, since both are limited by the same resource factors, i.e. sun, water, and soil nutrients. Where there are less than perfect conditions, the mutually beneficial interaction of components in the mixed system will give it dramatic advantages.

Multiple species of animals can keep the various plants on a site in balance without resorting to expensive or dangerous activities. Cattle graze only the grasses, thereby giving shrubs a competitive advantage. Unsurprisingly, over time, shrub control is called for when cattle graze as a sole species. But if one adds antelope and deer, which graze the shrubs, along with the cattle, a better plant balance can be reached. Replace the cattle with bison and elk, and we find that haying to provide winter feed becomes unnecessary (assuming that the native animals can range freely, and that they are harvested properly). As a rule of thumb, the more complex the system, the greater the number of interactions which occur. These, in turn, can assist in maximizing productivity and minimizing management costs.

A key factor in support of this diversity hypothesis is that nature, left alone after a major disturbance (such as fire or a volcano), almost never produces a monoculture. If a single species does become dominant, it is especially likely to be struck by disease, fire, or pests. We should expect that if a single species of either plants or animals could be more productive than a complex mixture, or more competitive in its use of available resources, we would have seen

more absolute dominance by single species in the vast experiment that was nature before the advent of man.

In terms of human-oriented productivity, protein and fiber are expected to be the most needed worldwide outputs from the land, for which meat represents the highest quality, most-sought-after form of protein. (It should be noted in this context that four-fifths of the current agricultural output of the United States is involved in the production of meat.) Meat produced by native species of animals on lands having wilderness qualities can have an especially high value to humans. For example, meat from our native game animals has notable health benefits for consumers, since it has much less fat, more unsaturates, and lower cholesterol levels than the meat of any domesticated species. It should command a premium price (and does, in the limited markets where it is now available), when appropriately harvested and distributed.

Wilderness areas, whether forest or prairie, shrubland or swamp, have other forms of productivity as well. Unlike the present situation where large acreages supply one product and one product only, using wilderness lands primarily for non-domesticated meat animal production also generates multiple by-products such as premium value mushrooms and fruits, select grade timber, and/or other economically important fibers and foods. To this direct output potential for wilderness areas must be added such indirect by-products as dramatically increased water quality and superior recreational opportunities.

Sufficient biological diversity on a site ends the need for broadcast (i.e., widely dispersed) biocides because the more complex system is much more self-regulating. It is also self-fertilizing. Its perennial root network cuts soil losses to replaceable levels, stores precipitated water, and restores soil tilth. Perennial-plant-based agriculture, which eschews heavy machinery and mimics a naturally diverse system, has closely related advantages. Self-regulating wilderness-like systems also allow for reduced management costs when compared with those for domestic

animals or traditional cropping, since the naturally-based systems require less mechanical and chemical activity, including less tillage and less fertilization.

Management for wilderness character can reduce world-wide fossil fuel demands, because it requires the use of far lighter, quieter, and therefore much more fuel efficient tools than are used in heavily mechanized agriculture. Lighter tools are essential to avoid unnecessarily disturbing the plant/animal/soil complex which could be working for us. The combination of less frequently used and more fuel efficient machines can reduce many forms of pollution, including carbon dioxide, as well as decrease stress on non-renewable resources.

In addition, the design, building, and utilization of effective wilderness management and harvest systems can offer more total employment, employment, it might be added, which is of a more pleasant and satisfying quality than the combination of mechanized agriculture and heavy industry. It presents less job-related danger because it is less resource-intensive. That is, it involves less exposure to poisons, extreme heat, and/or machines which drastically outweigh or overpower humans. Last, but not least, the technology needed for profitable land management and harvests from wilderness, as well as related techniques such as cooperative ventures, have broad applicability to other parts of society, well beyond the agricultural sector.

THE STICKING POINTS

Management for maximized economic yield from wilderness areas will require much larger contiguous areas of land, managed as a unit, when compared to contemporary land use patterns. There remains a lasting perception of economic bounty in the current system, despite the huge debt from subsidies and the deadly by-products of this system. Humanity has always tended to perceive the present way of doing things as the only viable solution ("we are alive, so we must be doing the best possible job..."). We too often fail to understand that even though there is good in what we have already done, there could be a still better way to do things.

Therefore, the greatest difficulty in achieving practical acceptance of wilderness as our most productive entity is the necessity for social cooperation, in combination with the recognition of a need for change.

Land with wilderness character does require more thought, and more understanding, for its successful management and harvest. Single crop land use has been easy conceptually, but the easiest approach to land management (or anything else) may not always be the best solution. Can we go on from the base monocultures have provided in our evolution, and see that we can have a diverse Eden all around us if we so choose?

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WILDERNESS AS LIVING HISTORY—TO BE, OR NOT TO BE*

FLOYD A. THOMPSON, III

Wilderness: a place, an idea, an illusion of individual minds, or an experience of immense value in realizing a collectively-held land ethic. It has been defined in various ways: an ecological reserve, Howard Zahniser's "untrammled" concept (Roth 1984); a spiritual reserve, John Muir's concept of "going to the mountains is going home..."; or others, such as Aldo Leopold who enumerated the untold values of simply having a "blank spot on the map." Yet, as a culture Americans (all Americans, native and immigrant) have an especially important definition of wilderness as a place of living history.

President Roosevelt, in speaking for the need to preserve our wilderness, highlighted the virtues of its living historical record (USDA 1974). "As one civilization grows older and more complex," he wrote, "we need a greater and not a less development of the fundamental virtues." To him wilderness meant not vistas of aesthetic delight, but places to act as a frontiersman. Aldo Leopold believed that the frontier also had a beneficial moral and psychological impact on our nation (USDA 1974). "Many of the attributes most distinctive of Americans," he said, "are due to the impress of wilderness and the life that accompanied it."

The wilderness landscape was also home to many Native American cultures. These landscapes in which they had lived for hundreds of years were the common denominator of everything they had known and perhaps might ever know—a profound knowledge. The native American experience of wilderness is a deep, ethical and religious regard for the land—one

which Leopold through his culture interpreted as an ecological conscience, a land ethic (Leopold 1949). "A land ethic, then, reflects the existence of an ecological conscience," he wrote, "and this in turn reflects a conviction of individual responsibility for the health of the land."

Wilderness the place, and wilderness as an experience, are inseparable in their value to American culture. The experience of the living history traditions of our National Wilderness Preservation System is of paramount value to an appreciation of wilderness ideals. The living history of wilderness gives us a starting point for knowing our roots and place in the natural order of life on this planet. Such traditions are vital elements of the total contribution wilderness makes in today's highly technological, automated, and pampered urban society. In essence, wilderness appreciation is a primary channel for developing wilderness values. These values are the fertile soil for the evolution of land ethics.

Living history relates to the tools, skills and written diaries of our self-reliant pioneering ancestors who learned to survive and commune with "wilderness." Not all are appropriate today for maintaining wilderness qualities, but most are human-power dependent, and as such are valuable as character-building experiences. The skills may range from mule packing and cross-cut saw maintenance, to backpacking, prospecting and orienteering. Written diaries may include autobiographies, old legends, or Native American beliefs. All contribute to people gaining empathy for their roots and a basic humility and awe for the quiet grandeur of our wild lands. These moments of revelation, achieved through personal experience of wilderness pioneering may provide the seeds for cultivating land ethics.

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Keeping living history traditions alive needs to be a primary function of wilderness management regulations and philosophy. It is disturbing to note that pressures are constantly bearing down on wilderness management agencies such as the National Park Service, Bureau of Land Management, and USDA Forest Service to reduce emphasis on this vital aspect of wilderness value. More and more the notion is pressed: why not allow motorized equipment for clearing downfall across trails? Why not walk a D-6 Caterpillar into the wilderness to repair or build stock tanks? Why not allow the State Game Department to sling-load in big horn sheep with a helicopter, or a grazing permittee to use a four-wheel-drive truck to haul fence material by the tons into the wilderness?

In legislated wilderness (as defined by the 1964 Wilderness Act [P.L. 88- 577] and subsequent legislation), many compromises were required in order to attain the required consent for establishing a National Wilderness Preservation System. In the interest of acquiring a greater land base preserved as wilderness, many of the original guidelines for evaluating the suitability of land for wilderness designation have changed.

Our ideas of what constitutes a suitable wilderness area have changed quite dramatically since Aldo Leopold's first ideas. In the Recreational Working Plan (USDA 1924) he wrote for the Gila National Forest Leopold expressed "...a strong sentiment for the retention in this region [Gila National Forest] of a wilderness hunting area." Leopold's idea of a suitable wilderness hunting experience demanded a minimum of a two-week pack train trip through an area. Today, few areas within the National Wilderness Preservation System (NWPS) would qualify under this criteria. Yet, most all of these areas do provide a setting and opportunity for people to re-enact some of the living history and pioneering skills associated with wilderness travel and use. Although we cannot always duplicate the land area requirements of Leopold's wilderness ideas, we can still provide the experiences and opportunities to know wilderness values through living history and pioneering skills. And these

experiences are what contributes to our appreciation and love of wilderness.

In 1976, Dr. Roderick Nash of the University of California, Santa Barbara, outlined ten categories of wilderness values in his paper *Wilderness: To Be Or Not To Be?* (Nash 1976). In his own words, the intent of the paper was to delineate "the collective contemporary wisdom on the meaning and importance of wilderness to civilization." In similar fashion, this paper attempts to delineate the meaning and importance of living history traditions and pioneering skills to the development of wilderness values. In turn, these wilderness values will be shown as the raw material with which to build Leopold's vision of a collectively-held land ethic.

In the interest of continuity, there follows a re-examination of the ten values enumerated by Nash, revealing some of the present contemporary wisdom on how living history traditions contribute to the meaning and importance of wilderness.

WILDERNESS: A RESERVOIR OF NORMAL ECOLOGICAL PROCESSES

How does one manage for the continued existence of a reservoir of normal ecological processes? Although, as Nash points out, this value does not entail human contact, it is impossible to escape humanistic concerns, in view of the fact that wilderness is a cognitive fabrication and by definition anthropocentric. Managing for normal ecological processes entails raising the costs both in terms of "sweat equity" and economics to change any facet of wilderness resources. Maintaining and perpetuating living history traditions and pioneering skills can significantly curtail adverse effects to wilderness ecosystems. Requiring use of only human-powered skills and tools not only provides an immediate filter for major changes to the land, it also contributes to the development of landscape changes which are small in scale and more compatible with the vernacular elements of a pristine setting—a leave-no-trace ethic.

Living history traditions help to place people in a setting where they must compete for a place in the community of life within wilderness. That community being not just the soils, waters, plants and animals, but also those other members of the "homo sapiens" race with whom they must cooperate to survive. People will only support the ecologic values of wilderness in relation to something they can see, feel, understand, love and otherwise have faith in (Leopold 1949). An ecological conscience, then, is a function of personal experiences with the living history of wilderness.

WILDERNESS: A NOURISHER OF AMERICAN CULTURE

"Art brings together the work of nature and the work of man. The work of art does not stand by itself; it is a chunk of nature highly encrusted by man," so wrote Frederick Sommer in 1982. Such revelation comes from a deep respect for the powerful forces nature plays in the artist mind's eye. Living in and working with a wilderness setting a person is transformed by the energy of his surroundings, and his artistic thoughts are inescapably influenced by these forces. Today's Native American Indian art is a continued reflection of living history traditions—much of which can be attributed to this power of nature and wilderness to influence artistic creativity.

As Nash indicates, so much of our American culture can be traced to our wilderness beginnings. That is still true today, even though many other stimuli exist, competing for the attention of young, entertainment-hungry minds. From the Fox Fire Books and Outward Bound Programs to dramatic changes in Scouting, all across America the lure of the living history of wilderness is helping to shape our culture. The success of the recent movie, "Crocodile Dundee" is perhaps one of the most contemporary statements on the continued role wilderness plays in shaping our American psyche.

As can be seen in the history of Scouting, not all living history traditions are good for the land. Old ideas of pioneering, such as bow beds

and trenching around tents have had to give way to Thermarest pads and improved site selection with nylon taffeta tents. Yet, the experience of living history is still present and working to shape our future generation's values. Mountain men rendezvous, cross-cut saw competitions, outfitter guide pack trips, muzzle-loader/bow hunts, white water expeditions, all these and more are part of the living history traditions of wilderness.

The continued intrusion of technology which lessens the clarity and exhilaration of these living history experiences threatens the value of wilderness to our society. Modern conveniences of helicopters, chain saws and motorized vehicles are being utilized in greater numbers in wilderness through the exceptions provided by legislation. These seriously erode the living history traditions of wilderness.

WILDERNESS: A SUSTAINER OF AMERICAN CHARACTER

The tie between American character and wilderness was forged during three centuries of pioneering history and traditions. The living history traditions of today are the reminders of our American pioneering days. "Independence and rugged individualism," wrote Nash, "were two heritages of pioneering, and pioneering was only made possible by the presence of wilderness."

More than any other, this value of wilderness highlights the tremendous significance of living history traditions. "It followed," as Nash states, "that one of the most important values of wilderness was keeping alive American traits and American styles." Aldo Leopold also mused over this key value. "Is it not a bit beside the point," he observed, "for us to be so solicitous about preserving American institutions without giving so much as a thought to preserving the environment which produced them and which may now be one of our effective means of keeping them alive."

It is important for us to realize that the great challenge of today is not the preservation of wilderness—the land, but wilderness as an experience of living history. The Boy Scouts of

America have realized this as well as others such as: the Student Conservation Association, Inc. (SCA), Appalachian Mountain Club (AMC), and Sierra Club, to mention a few. As examples, the Boy Scouts Philmont Ranch in Cimarron, New Mexico, the SCA Wilderness Skills Workshop in Yellowstone National Park, the AMC Club Outdoor Leadership School in New Hampshire, and the Sierra Club's international service trips all provide excellent channels for keeping living history traditions a vital part of wilderness.

The National Outdoor Leadership School (NOLS) in Lander, Wyoming is perhaps one of the best examples of a modern day pioneering tradition for wilderness. Less known is the USDA Forest Service's traditions and wilderness philosophies which have constantly identified the living history of self-reliant pioneering skills as an essential element of their wilderness management policy. Such men as William "Bill" Worf, Jim Dolan, Ed Bloedel, Richard Spray and Paul Weingart are current-day voices for perpetuating this essential wilderness value so eloquently stressed by Aldo Leopold over a half century ago. The Forest Service's recent endorsement of a National Primitive Skills Award (a brainchild of William "Bill" Worf) is a statement of national significance for the importance of wilderness as a living history tradition.

WILDERNESS: AN HISTORICAL DOCUMENT

Archaeologists and landscape architects alike know that landscapes are canvases of time-masterpieces of both biological cycles and man's experiments to tame them for the benefit of civilization. A portrait of the land is a signature of time. Time is ever changing the composition. Wilderness landscapes are no different. They contain the record of the accounts of Lewis and Clark, the portraits of Thomas Cole, Charles Russell, and the contemporary photographs of Ansel Adams and Eliot Porter. Comparison of each will reveal not a static image, but an evolving image of the dynamic ecosystems as they have been affected by both man and nature.

How can we understand the people who lived these landscapes—their anxieties, their joy, their triumph, their desolation—without re-enacting the traditions and living with the natural elements as they might have done. Kit Carson, Daniel Boone, Eliot Barker, James McKenna—how will we ever know these men without knowing firsthand some of the environmental circumstances. Living history traditions must be experienced. Wilderness management direction (as promulgated in USDA Forest Service regulations) recognizes historical values as a part of the total wilderness resource. Old Forest Service Ranger's cabins, for example, are now preserved and utilized for the future use and administration of wilderness. Deep in the heart of the Gila Wilderness, New Mexico lies the old White Creek Ranger's cabin. A sign denotes its place on the National Register of Historic Places. Would James "Jimmy" McKenna, who roamed this country in the latter half of the 19th century, know this place? Who knows? Who cares? Well, Jimmy did.

Old Jimmy McKenna kept alive the living history of the Gila Wilderness through his stories and writings (McKenna 1936). His collection of stories in "Black Range Tales" forever preserves a picture of wilderness unavailable to today's wilderness user.

Having read his stories enriches the traditions and dimensions of a wilderness visitor as they explore the country he wrote about. One can still live with the real experience of having a bear visit their camp, but gone are the days that that bear will be a southwestern silver-tipped grizzly. Reliving the living history of wilderness, practicing primitive skills, and traveling lightly on the land, one comes to fully appreciate wilderness as more than space on a map—it becomes a place.

WILDERNESS: AN EGO TRIP

Ego trips are like affixing a name to a plant. In the naming, somehow a false veil of knowledge appears, and then vaporizes, as it too is discarded for the new challenge of finding the next unsuspecting, unnamed plant. The egocentric values Nash enumerated for

wilderness are perhaps the most troublesome, yet truthful about the living history traditions of wilderness. To be of value they must be seen as stepping stones toward acquiring the experience necessary for appreciation of other wilderness values. Today's peak bagger, or mountain runner may someday become tomorrow's Robert "Bob" Marshall. Any study of Bob Marshall can never exclude his insatiable exuberance for climbing mountains. A photograph of a broad-grinned Marshall along with two other men who had bagged 42 of the 46 Adirondack Mountain peaks above 4,000 feet (Vickery 1985) is testimony to his character. Yet, through this drive, Marshall came to know and love wilderness vibrantly—leading him to a life-long career to seek its preservation.

Aldo Leopold's account of "Escudilla" (Van Matre - 1983) is an enlightening story about living history traditions and wilderness as an ego trip. Leopold was a dyed-in-the-wool hunter in his early days. After having shot a large wolf he saw the green fire slowly fade from the eyes of the dying animal. Since that day he started to question the continuing role of hunting and the need to keep wildness alive in wilderness. His account of the fate of the last grizzly bear on Escudilla Mountain, Arizona reveals much about how living history holds precious wisdom on the importance of wildlife, wildness and wilderness. "No one ever saw the old bear," he wrote, "but in the muddy springs about the base of the cliffs you saw his incredible tracks." Whenever cowboys rode the range, Aldo noted, "they saw the mountain, and when they saw the mountain they thought of bear." Then one day a government hunter, proud of his trade, emissary for progress, symbol of the egocentric society of his day, came out and hunted down the lone surviving grizzly on Escudilla. Aldo reflected, "...who wrote the rules for progress?"

Since the beginning, time had gnawed at the basaltic hulk of Escudilla, wasting, wanting, and building. Time built three things on the old mountain, a venerable aspect, a community of minor animals and plants, and a grizzly." In reflection, Aldo writes, "Escudilla still hangs on the horizon, but when you see it you no longer think of bear. It's only a mountain now." Living history as told by Leopold and others,

shows not only the benefits of ego-satisfying experiences, but the folly of allowing these to dominate and exclude the diversity of other wilderness values.

WILDERNESS: A SETTING FOR FEAR AND PAIN

Living history brings alive the images for fear and pain in wilderness. Primitive skills and traditions demanded by wilderness laws and regulations allow us to experience fear and pain—firsthand. In wilderness, one can get lost, die of exposure or thirst, be eaten by animals or bitten by snakes. Such is the fascination of wilderness. Without the living history tradition and regulations requiring only primitive travel and skills, how would the natural setting for fear and pain exist, except as produced by man's atrocities against his own?

Primitive transport and skills as a requirement to use wilderness is management for the preservation of wilderness as an experience of living history traditions. Bring in the helicopter to airlift supplies, mountain bicycles to shorten the distance, power saws to expand the trails, transmitter remote stations to predict the weather, and radio collars to pinpoint visitor travels. And what remains? Wilderness, a space on the map: an illusion. The place of wilderness is severely diminished if not totally destroyed.

Does this mean no-rescue wilderness is real wilderness? Yes! Is it human nature for society to consciously allow self-inflicted fear, pain, even death? No comment—the medical world is fast pushing this question towards our collective conscious every day.

WILDERNESS: A SUSTAINER OF HUMAN DIGNITY AND DIVERSITY

Living history preserves not only ecological diversity in wilderness, but social and intellectual diversity as well. In Wallace Stegner's perception, wilderness is "a place of perpetual beginnings...a part of the geography of hope." As Aldo Leopold wrote in his account of A Sand County Almanac, "I am glad I shall

never be young without wild country to be young in. Of what avail are forty freedoms without a blank spot on the map."

Living history traditions and primitive skills are the tools for experiential education in wilderness. Many outdoor youth programs now use wilderness styled, living history traditions to teach human dignity and diversity. As examples, the YMCA and YWCA have enjoyed an expanding popularity for their Young Indian Princess and Guide programs, which focus on child/parent bonding through wilderness-styled experiences.

Perpetuating and recreating the living history traditions of wilderness provides an important avenue for people to appreciate the value of wilderness before ever setting foot in the place. The ideal setting for achieving the full import of living history experiences is the wilderness setting itself. As John Hendee identified in a recent paper, this experience can also be achieved through totally natural environments—thus preserving both wilderness ideals and environments for the truly prepared (Hendee 1986). As Hendee states, "In the natural environment (ideally in wilderness), away from the social pressures, excessive stimuli, and diversions that choke our lives, we can confront ourselves in depth, identify our values and priorities, and recover a sense of wholeness." Not only has this become an important part of outdoor youth programs, it is fast becoming a highly popular avenue for corporate America to revitalize their most precious resource—their people.

WILDERNESS: A CHURCH

The best and most lasting testimony to the value of experiencing wilderness as a church through living history is to listen to the words of those who were inspired by living "wilderness". "The old people came literally to love the soil and they sat or reclined on the ground with a feeling of being close to a mothering power. It was good for the skin to touch the earth and the old people liked to remove their moccasins and walk with bare feet on the sacred earth." Chief Luther Standing Bear, Land of the Spotted Eagle (Van Matre 1983).

"I went to the woods because I wished to live deliberately, to front only the essential facts of life, and see if I could not learn what it had to teach, and not, when I came to die, discover that I had not lived." (Henry David Thoreau). "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 streams their energy, while cares will drop off like autumn leaves." John Muir (1830-1914).

WILDERNESS: GUARDIAN OF MENTAL HEALTH

The value of wilderness living history traditions is that they allow us every so often to slip back into what Sigurd Olson (a veteran north country canoeist) calls, "the grooves of ancestral experience." These ancestral experiences may be Anglo Saxon pioneerism, Hopi Indian rituals, or early Neanderthal man hunting instincts. All reflect primitive skill experiences and the lessons of survival in the wilderness.

Today many programs, such as Wilderness Vision Quest, or the Ropes Course (Heights Psychiatric Hospital, Albuquerque, NM), have been developed to give people a chance to share the deeply held American belief that wilderness experiences can provide the most important lessons of life. They can help people find personal renewal and cope with change. The stress induced by practicing wilderness travel and skills can be positive therapy for those dealing with the trauma of domestic instability and abuse, those adjusting to deaths or broken relationships, or those recovering from drug dependent lives. These living history traditions and primitive skills again hold wilderness settings as the ideal, but are not totally wilderness dependent for success. The artificially-induced stress of the "Ropes Course" uses the risks and challenges inherent in the course to recreate wilderness-related conditions and uses those for positive personal growth. These artificial tests provide the preparation for the final proving ground, where the presence of wilderness solitude and natural grandeur combines with the stress of wilderness rock

climbing to produce positive self-discovery experiences. Living history experiences provide an avenue for people to hear the songs of the wilderness, to refresh their weary souls and remove themselves from their sterile urban boxes.

WILDERNESS: AN AID IN DEVELOPING ENVIRONMENTAL RESPONSIBILITY

In a recent article discussing Aldo Leopold's call for a land ethic, Charles Little asked, "How come America still lacks a land ethic, especially in view of the fact that so many other countries—most of them without the rich, diverse, culturally important land that America possesses in abundance—have managed to create permanent national policies for land conservation and landscape preservation?"

The reason, in part, stems from our country's fascination with the outward view and myopic focus on land as mere space—and eclipsing the infinite importance of transforming the heart and dealing with living history traditions, which translate wilderness into a language of place. As Leopold stated, "Ability to see...value of wilderness boils down, in the last analysis, to a question of intellectual humility...it is only the scholar who understands why the raw wilderness gives definition and meaning to the human enterprise."

To reach a state of intellectual humility where wilderness can be understood as a language of place, requires more than just scholarly pursuits; it requires a total interaction with the living history of wilderness—the total realm of its symbolic and spiritual value. Wilderness as a space can be a setting for potentials, but wilderness as a place is the fulfillment of the promise—where wilderness ideals take on true meaning through experiences with primitive skills and living history traditions.

The question is no longer how much wilderness is too much, rather - how will we realize the land ethic teaching potential inherent in the current wilderness estate. The importance of preserving the setting for maintaining

primitive skills and teaching living history traditions must be the new focus for wilderness and their attendant managers in the decades to come. That calling translates into not just new public land management agency policies, but an individual responsibility for each person to commit to be involved in keeping the living history of wilderness alive—whether in YMCA, Boy Scouts, Vision Quest, 4-H Clubs, Student Conservation Association, Sierra Club, Appalachian Mountain Club, Wilderness Society, or any other available community or religious channel. An old Chinese proverb stated an eternal truth about understanding the learning process:

"I hear and I forget;
I see and I remember;
I do and I understand."

An increasingly popular channel for experiencing the living history of wilderness is to become a volunteer in one of the many programs now available through the USDA Forest Service, and other federal, state and local agencies. Programs range from adopting trails to patrolling the back country as wilderness "hosts". They all offer an opportunity for people to give something back to the land and experience the living history of wilderness. "Nothing so important as an ethic is ever written," Leopold noted, "rather it evolves in the mind of a thinking community." "The failure, and it is the worst kind of failure of all," Charles Little recently wrote, "is the failure to try."

That effort must begin not only with governmental policy, but at home, with the individual. "You must teach your children," Chief Seattle once wrote, "that the ground beneath their feet is the ashes of our grandfathers. So that they will respect the land, tell your children that the earth is rich with the lives of our kin. Teach your children what we have taught our children—that the earth is our mother. Whatever befalls the earth, befalls the sons of the earth. If men spit upon the ground, they spit upon themselves...This we know. The earth does not belong to man; man belongs to the earth. This we know. All things are connected like the blood which unites one

family. All things are connected. Whatever befalls the earth befalls the son of the earth. Man did not weave the web of life; he is merely a strand in it. Whatever he does to the web, he does to himself..."

Take a walk into the living history of wilderness—teach your children well!

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ECOSYSTEM REPRESENTATION AS A CRITERION FOR WORLD WILDERNESS DESIGNATION*

GEORGE D. DAVIS

ABSTRACT

The value of preserving the natural diversity found within the Earth's major ecosystems is discussed. A new, world-wide preservation effort to identify and preserve samples of these ecosystems is proposed. Such a program would fit in the mid-range of a spectrum of preservation programs that include the MAB biosphere reserve program at one end and various site specific programs at the other end. Follow-up at the Fifth World Wilderness Congress is suggested.

THE PRESERVATION OF NATURAL DIVERSITY

Importance

Scientists have long extolled the importance of preserving the widest possible spectrum of life forms. It is only in recent years, however, that lay conservationists and political leaders have understood that the preservation of natural diversity may very well be vital to the survival of the human race. Without question, the quality of life for future generations will benefit significantly if this generation takes steps to insure the preservation of portions of all the major ecosystems represented on this planet.

Natural diversity must include both biological diversity and a diversity of physical environments. Biological diversity includes both species diversity and genetic diversity

within species. Natural diversity incorporates the physical environment within which species interact with biological diversity. Natural diversity is, therefore, synonymous with ecosystem diversity. Hence, the preservation of the widest range of natural diversity must, in a practical sense, be based on the preservation of a full range of functioning ecosystems.

Much has been written and spoken in defense of the preservation of natural diversity, so I will not go into detail reiterating the myriad values to be derived from such preservation. Suffice it to say that the literature clearly documents both the anthropocentric and the ecocentric, or biocentric, values of such preservation. We in the wilderness field should be especially concerned with the ethical and stewardship values of natural diversity preservation, for wilderness is a mechanism by which we grant future generations maximum options to enjoy an array of natural landscapes and their constituent ecosystems. It is important that we recognize, however, that wilderness is but one mechanism for protecting selected portions of our natural landscape.

Our Protected Area Systems

The most widely accepted world-wide inventory of protected areas is the United Nations List of National Parks and Protected Areas (IUCN 1985) prepared and kept current by the International Union for Conservation of Nature and Natural Resources (IUCN). In developing this inventory it was essential that the IUCN use definitions, i.e., categories, that could be applied world-wide rather than using the highly variable nomenclature of each individual nation. Such management categories are then applied according to the actual management situation found on an area, where known by IUCN, regardless of the area's legal

*in Krumpel, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

definition. The ten management categories chosen by IUCN are:

- I. Scientific Reserve/Strict Nature Reserve
- II. National Park
- III. Natural Monument/Natural Land-mark
- IV. Nature Conservation Reserve/Managed Nature Research/Wildlife Sanctuary
- V. Protected Landscape or Seascape
- VI. Resource Reserve
- VII. Natural Biotic Area/Anthropological Reserve
- VIII. Multiple Use Management Area/Managed Resource Area
- IX. Biosphere Reserve
- X. World Heritage Site (Natural)

It is interesting that "wilderness" is not recognized as a separate category. This occurred even though the evolution of the ten categories took place when world-wide interest in wilderness designation was intense and increasing. We hope that as the IUCN categories are revised to better achieve their objectives a wilderness category will evolve.

IUCN categories that must, by definition, include areas managed essentially as wilderness are: Category I - Strict Nature Reserves, Category II - National Parks, and Category IX - Biosphere Reserves. In addition, Categories III, IV, V and X may have areas within them that are managed as wilderness as may Categories VI and VII, but in the latter two cases such areas may not have permanent protection.

Complicating the integration of the wilderness concept with IUCN management categories is the fact that, at least in the United States, many designated wilderness areas are not included in the United Nations List of National Parks and Protected Areas. Although only five nations currently have formally designated wilderness areas, numerous others have areas set aside for the protection of wilderness values (Stankey 1987). With the increasing support for wilderness preservation and the growing recognition that no dichotomy exists between an indigenous hunter-gatherer civilization and wilderness, many additional nations will

undoubtedly be designating wilderness areas under varying nomenclature. Such areas should be recognized in a distinct IUCN category.

One of our objectives should be to assist the IUCN with their protected area inventory data file and to request IUCN to add wilderness as a distinct management category in their data base. It would be relatively simple to develop a computer program that would enable the IUCN to add such a management category and cross reference their existing categories to footnote duplicate entries. Such duplication already exists in the system; for instance, several national parks are included in both Category II (National Parks) and Category IX (Biosphere Reserves). Likewise, wilderness areas within national parks would appear in any new wilderness category as well as in Category II (National Parks). However, the majority of designated wilderness areas, at least within the United States, would be new entries to the IUCN list. Since they clearly qualify as "Protected Areas", it would seem appropriate for them to be listed in the United Nations List of National Parks and Protected Areas.

Preserving Representative Samples of Natural Ecosystems

Mega-Reserves: MAB Biosphere Reserve Program. IUCN protected area Category IX, Biosphere Reserves, represents the only global program expressly designed to preserve representative samples of the earth's major natural environments. The Biosphere Reserve program was developed as part of UNESCO's Man and the Biosphere Program (MAB). The MAB program was established in 1971 with the first biosphere reserves being designated in 1976 (UNESCO 1984). As of July, 1987, the biosphere reserve network has grown to a total of 266 reserves in 70 countries (Gregg 1987 personal communication).

One of the principal characteristics of a biosphere reserve is that it contains a core area or areas that include representative samples of natural or minimally disturbed ecosystems (UNESCO 1984). The "Action Plan for Biosphere Reserves," adopted by the MAB International Coordinating Council at its eighth

session on December 3-8, 1984, states that "One of the principal objectives of the Action Plan is to improve and expand the world coverage of biosphere reserves by including representative ecological areas within each of the world's biogeographical regions, in their natural state. . . ." (UNESCO 1984). The biogeographical provinces referred to in the Action Plan are those developed by Udvardy (1975). These biogeographical provinces will be discussed in detail later in this paper. The 266 biosphere reserves designated to date are located within 100 of the 193 biogeographical provinces identified world-wide by Udvardy.

Thus, the MAB biosphere reserve program anticipates the preservation of representative samples from each of the world's 193 biogeographical provinces. This is a worthy goal, a goal to be applauded. It was never intended, however, that the biosphere reserve program by itself would preserve samples of all the world's major ecosystems within each biogeographical province. Although the MAB biosphere reserve program plays an increasingly important role in the preservation of natural diversity, it must be supplemented if we are to have a systematic program designed to maximize the preservation of ecosystem diversity. It is my contention that wilderness can and should play an important role in such a program.

Mini Reserves: National Nature Reserves, et al. Whereas the MAB biosphere reserve program forms one end of the spectrum of natural diversity preservation efforts at the international level, we find the other end of the spectrum being occupied by programs of individual nations, states, provinces, agencies and private conservation organizations. The United Kingdom, Indonesia, and the Soviet Union are examples of countries that have extensive systems of relatively small national nature reserves. Mexico's Pronatura, Columbia's Fundacion Natura, the United States' Nature Conservancy, and England's National Trust are examples of non-governmental conservation organizations that own and operate nature reserves.

The common thread among such nature reserves is that they are designed to preserve a

specific, and often either spectacular or endangered (or both), ecosystem, species and/or habitat. By and large, these reserves are quite small, generally a few tens or hundreds of hectares.

The Need: A Pragmatic Mid-Level Program. A global program intended to preserve natural diversity must, of necessity, include a spectrum of protected areas. The MAB biosphere reserve program is now firmly established at the broad, biogeographical province end of such a spectrum and the site specific protection programs of many nations are at the mini-reserve end. No systematic global program, however, is focusing on the intermediate levels where the vast majority of identifiable, functioning ecosystems occur. This major gap must become the focus of a new international protected area program to ensure the preservation of a reasonable cross-section of ecosystem diversity throughout the world.

A diverse bank of protected ecosystems can and should be created. But first we need a more refined or specific global ecosystem classification than biogeographical provinces. This paper will discuss one approach to such a program. We must, however, better define the term "ecosystem" before proceeding further.

Defining Ecosystem - A Matter of Scale

Tansley (1935) is credited with coining the term "ecosystem" (Dasmann 1972). Tansley used the term to describe a "biotic community interacting with its physical environment" (Dasmann 1972). Thus, in the sense Tansley used the term, an ecosystem could be readily mapped by delineating the boundaries of any particular community. The scientific definition of the term "ecosystem" has since become more complex, incorporating energy flow, soils, and physiography. Still, the basic concept as expressed by Tansley is of immense value to lay persons, generalists in the natural resources field, public policy-makers, and government officials.

The Tansley concept allows us to view the earth as a series of ecosystems whose components are dependent upon one another.

Yet these ecosystems also interact. As Bailey has pointed out "The boundaries of ecosystems, however, are never closed or impermeable; they are open to transfer of energy and materials to or from other ecosystems." (Bailey 1982). It is possible to develop a defined hierarchy of ecological units of different sizes that reflects a continuum of ecosystems. The largest is formed by the planet Earth; examples of small ecosystems include a narrowly limited, homogeneous stand of vegetation or a small pond. Since ecosystems are spatial systems, they will be consistently inserted, or nested, into each other (Bailey 1982).

As an aside, it is useful to note that in choosing an appropriate definition of ecosystem and an appropriate hierarchical classification system, the purpose to which the definition and resultant classification system is to be put must be considered. When the purpose behind the choice of an ecosystem classification scheme is to preserve representative samples of ecosystems, the plant and animal components of such systems determine the minimum critical size for reserves. Larger reserves tend to reduce or prevent the loss of individual species and communities (Diamond 1975; Torborgh 1975). Recent studies by Newmark (1987) confirm this in so far as mammalian extinctions in western North American parks are concerned.

Early efforts at mapping ecosystems centered around the vegetative element. For example, Clements (Weaver and Clements 1938) described and mapped major climax plant communities. A year later Clements worked with animal ecologist Victor Shelford to develop the concept of the biome, an area defined by climax vegetation and its associated animal life (Clements and Shelford 1939). The biome concept is particularly useful because it is based on readily visible species. Since it relies on the climax vegetative type, it is most useful in areas where human disturbance has been minimal, areas where a wilderness classification has not yet been foregone.

Later in this paper, I will recommend combining Udvardy's biogeographic provinces with more specific vegetative community information in order to develop a classification

system useful in the mid-range of our protected area spectrum.

A NATIONAL CASE STUDY - UNITED STATES

An example of one nation's attempt to link the preservation of ecosystem diversity with wilderness classification decisions took place in the United States between 1977 and 1979.

The Second National Forest Roadless Area Review and Evaluation (RARE II)

In 1977 the Forest Service, an agency of the United States Department of Agriculture, undertook a review of 62 million acres (24,800,000 hectares) of roadless and undeveloped lands under its jurisdiction to determine which of these lands should be incorporated into the National Wilderness Preservation System (NWPS). Early in the process the Forest Service decided that preference would be given in allocating roadless areas to wilderness if the addition of the areas would increase the diversity of the NWPS (USDA 1978a).

The Forest Service, in its RARE II program, merged two widely accepted national ecological classifications: Bailey's ecoregion concept (Bailey 1976) and potential natural vegetation (Kuchler 1966, Ewel and Whitmore 1973). This produced a particularly strong system emphasizing both factors from the physical environment such as climate and soil and factors of the biological environment such as vegetation. (Vegetation generally defines the animal life in the area.) Using this system, the Forest Service mapped 242 distinct ecosystems in the United States and Puerto Rico (USDA 1978a). Refinement by Bailey (1980) and Davis (1980, 1984), as well as research for this paper, indicates that the actual number is 261. While other classification systems could be designed to describe the vast natural diversity found on lands administered by the Forest Service in perhaps as few as fifty or as many as five hundred basic ecosystems, the one chosen for use by the Forest Service provides enough detail to be biologically significant yet broad enough to be easily understood by lay persons.

The Bailey-Kuchler System, as it became known, readily lends itself to further refinement; e.g., it places little emphasis on aquatic ecosystems. Furthermore, the small scale (1:7,500,000) obviously omits much on-the-ground heterogeneity. Federal Research Natural Area programs, the Experimental Ecological Reserve program (Institute of Ecology 1977) and the individual states were encouraged to refine this system to help ensure that representative samples of the United States' natural heritage would be set aside for posterity.

In evaluating diversity in the National Wilderness Preservation System, the Forest Service defined adequate representation of each Bailey-Kuchler ecosystem as two or more distinct examples of at least four hundred hectares apiece. This definition left a margin of error for mistaken or atypical classifications. In addition, if preservation of a nation's basic ecosystems is a legitimate objective, it was recognized that the areas selected as representative must epitomize the ecosystem.

The Impact of RARE II on Ecosystem Preservation in the United States

As a result of the RARE II process and the political process of formally designating wilderness areas, 157 of the United States' 261 basic ecosystems are now represented in the NWPS as compared to 131 prior to RARE II (USDA 1978b). At least 11 more ecosystems are in national parks and wildlife refuges that have been recommended for wilderness designation but are still awaiting Congressional action. Since the Bureau of Land Management of the United States Department of the Interior has also agreed to use the Bailey-Kuchler concept of ecosystem representation as a criterion in its current wilderness studies, it is expected that diversity within the NWPS will be considerably increased. Because of these two agency decisions to adopt diversification of the National Wilderness Preservation System in the United States as a criterion for wilderness designation, I estimate that the number of ecosystems represented in the NWPS will have been increased by 50%, from 131 to an estimated 200, between 1978 and the end of the

century, if our public land managing agencies do not lose their commitment to this criterion. It is anticipated that most, but not all, of the forest and desert ecosystems in the United States will be represented in the NWPS by the year 2000. Unfortunately, few of the fertile native grassland ecosystems are likely to be represented since most of these lands are in private ownership and lack the scenic splendor that spurs the citizenry to seek wilderness designations. The scientific community must play a more active political role if truly diverse areas are to be preserved as wilderness.

More remains to be done, but an impressive step forward to insure the preservation of ecosystem diversity has taken place in the United States.

EXTENDING THE CONCEPT WORLD-WIDE

It is widely recognized that the preservation of natural diversity through a system of protected areas should be a high priority goal world-wide (Dasmann 1972; Davis 1984; UNESCO 1984; et al.). Participants in this Congress have the opportunity, and perhaps the obligation, to return to their homelands and use their interest, knowledge, and influence to move this concept forward. The remainder of this paper will describe what needs to be done, and how each of you can assist in expanding our sketchy information base in order to hasten the day when all of this planet's major ecosystems will be at least minimally represented in a protected area system.

Which Ecosystem Classification to Use?

Two critical factors in choosing a method of classifying ecosystems that is useful for measuring our progress in preserving ecosystem diversity are (1) that the method build upon the internationally accepted biogeographical province classification, and (2) that it be hierarchical in nature. The latter allows for further refinement and helps assure that a

complete spectrum of protected area systems may eventually result.

Biogeographical Provinces. As mentioned previously, the IUCN and UNESCO's Man in the Biosphere program have agreed on a classification of the biogeographical provinces of the world. Furthermore, the Biosphere Reserve project of MAB states that one of the three principal thrusts of its program "is to improve and expand the world coverage of biosphere reserves by including representative ecological areas within each of the world's biogeographical regions in their natural state..." (UNESCO 1984). This commitment within an ongoing and widely respected international program deserves our wholehearted support. However, it has also been pointed out previously that this program is designed as a mega-reserve program based on broad and generalized biogeographical provinces. It is up to us and others interested in the preservation of our natural environment to build upon the UNESCO commitment. I would suggest that a first step in doing so should be the refinement of each individual biogeographical province. To accomplish this we need to have a fuller understanding of how the biogeographical provinces are constituted, and we need to explore possible vegetation systems that would refine and complement the biogeographical province concept.

The biogeographical province concept has grown from the seminal work of Dasman (1972, 1973, 1974) to Uvardy's Classification of the Biogeographical Provinces of the World (1975). This classification builds upon the century-old work of Wallace (1876) that classified the world into major faunal regions. Wallace's six faunal regions were expanded to seven by Dasman (1972) and finally to eight "realms" by Uvardy (1975): Nearctic, Palaearctic, Afrotropical, Indomalayan, Oceania, Australian, Antarctic, and Neotropical. These realms were then subdivided into provinces that reflect generalized floristic and faunal characteristics. This realm-province classification is paired with a biome system of classification that is particularly useful because it conforms to that which can be readily observed by lay persons and professionals alike.

The resultant classification consists of 193 biogeographical provinces each of which is assigned a three number code (realm-province-biome type) and a name. Maps indicating the approximate location of each of these biogeographical provinces are included in Uvardy's paper (1975).

Bailey's Ecoregions. In the United States case study cited previously, the Bailey portion of the Bailey-Kuchner system was essentially a refinement and further subdivision of the biogeographical provinces of Uvardy (Bailey and Hogg 1986). The Bailey system of ecoregion mapping (Bailey 1976, 1980, 1982) has proved to be a useful refinement of Uvardy's biogeographical province classification. It must be emphasized that Bailey's work is a refinement that complements the Uvardy work and in no way replaces it. Unfortunately, Bailey's ecoregion mapping has been confined to North America, although he proposes to expand the system world-wide (Bailey and Hogg 1986).

Such refinement of biogeographical provinces is necessary not only to subdivide these units into more workable and specific ecosystems but also to add the detail to the boundaries that was not possible at a global scale. For instance, in the Soviet Union Voronov and Kucheruk (1979) have refined the biogeographical provinces in mountainous areas to better reflect vertical zonality. It has also been recognized that boundary refinement has been necessary to better reflect some of the broader ecotones such as forest-steppe (Bailey and Hogg 1986).

UNESCO Vegetation Mapping Program. In order to refine biogeographical provinces into component parts that will better reflect the frequently diverse ecosystems within each province, it is necessary to combine a more detailed and complementary classification system with that of Uvardy's. Bailey's work is useful but, as stated previously, not yet available globally. Therefore, I suggest that vegetation maps, particularly those that reflect an area's natural climatic or spontaneous vegetation formations be chosen. One logical

choice would be the maps resulting from the UNESCO vegetation mapping program. To date this program has produced three 1:5,000,000 scale maps covering the Mediterranean Zone (UNESCO 1970), South America (UNESCO 1981), and Africa (UNESCO 1983). In the United States' case study, Kuchler's potential natural vegetation mapping was chosen in the absence of a UNESCO vegetation map. Nations should be encouraged to chose their own refinements of the biogeographical provinces that they believe best meet their needs. I only suggest the UNESCO vegetation mapping program where it exists as one alternative.

Such a system of refining the biogeographical province classification lends itself to further hierarchical refinement down to the site specificity necessary to preserve individual specimens, whether plant or animal.

The addition of a more specific vegetation classification to the biogeographical provinces does not necessarily resolve other necessary refinements. After all, the province level of the Udvardy system already relies heavily on climax vegetation, so whereas the addition of more specific vegetation information allows for a more detailed vegetative subdivision it does not necessarily refine climate, soil, or other important ecological factors. It does, however, still give us a strong rationale for expanding our protected area systems to include greater ecosystem diversity. We cannot wait until the perfect system exists or our opportunities to preserve remnant ecosystems may frequently be lost. The hierarchical nature of the classification system proposed in this paper allows continuous refinement without jeopardizing actions taken now.

Computerization. A desirable feature of such an expanding hierarchical classification system and accompanying program is that it lends itself to eventual computerization. For example, a mapping/graphic system exists in the Florida Resources and Environmental Analysis Center at Florida State University. This type of system has the capability not only of producing high quality colored maps of various scales but also of overlaying different maps to produce

composites (Crumpacker 1985). It allows researchers to combine various classification schemes with protected area maps to determine which ecosystems are represented in protected areas and where remnant specimens of unprotected ecosystems exist. Such computer systems can be readily integrated into fully developed geographical information systems.

Schematic Application

I have applied the concept of refining biogeographical provinces to an ecosystem level based on vegetation for IUCN protected area categories I, II and IX in all of the Afrotropical realm, all of the Neotropical realm except Central America, Mexico, and the Caribbean, and the United States' portion of the Nearctic realm. For the Afrotropical and Neotropical realm I used the recent UNESCO vegetation maps (1983, 1981) while in the United States the combination Bailey-Kuchler map (USDA 1978a) was used for refinement purposes, i.e., to define "major ecosystem". Additional vegetation information was extracted from the IUCN Directory of Neotropical Protected Areas (1982), IUCN Directory of Afrotropical Protected Areas (1987), USDA Roadless Area Review and Evaluation Draft Environmental Impact Statement (1978), and personal knowledge. The results are included in Appendix A. A summary of these results follows.

Afrotropical Realm. In the Afrotropical realm 203 ecosystems were identified. Using the three IUCN management categories that by definition clearly incorporate wilderness management (categories I, II, and IX), and vegetation data from the IUCN (1987) and UNESCO (1983), I determined that of the 203 ecosystems in the Afrotropical realm 117 are represented in designated protected areas dedicated to nature preservation. Thus 86 ecosystems, or 42%, appear not to be represented in any preservation-oriented protected areas. It is on these 86 ecosystems that we should concentrate our designation efforts in the Afrotropical realm if increased ecosystem representation is to be one of our objectives.

Neotropical Realm. In the Neotropical realm (excluding Central America, Mexico and the Caribbean except Puerto Rico) 296 ecosystems were identified. Of these, 143 appeared to be represented in preservation-oriented protected areas according to IUCN (1982) and UNESCO (1981) vegetation information. Thus, 153 ecosystems, or 52%, are not assured representation as remnant ecosystems to future generations. It is on these 153 ecosystems that we should concentrate our designation efforts in the Neotropical realm if increased ecosystem representation is to be one of our objectives.

Nearctic Realm. In that portion of the Nearctic realm within the United States (i.e., excluding Hawaii and southern Florida), 248 ecosystems have been identified using the Bailey-Kuchler method of refining the biogeographical provinces. Of these, 164 ecosystems or 66% are represented in preservation-oriented protected areas (IUCN 1985) or in units of the National Wilderness Preservation System. Thus our designation efforts in the United States should concentrate on the 84 ecosystems not presently represented in any preservation-oriented protected area system if increased ecosystem representation is to be one of our objectives.

Remaining Realms. Analyzing each of the biogeographical provinces of the remaining five realms in the world, I found that only 8 of the 95 biogeographical provinces in these five realms lack representation within a preservation-oriented protected area system. In these five realms our efforts should be twofold. First, we should work toward completing representation in all of the biogeographical provinces. This effort should be done in concert with the MAB biosphere reserve program. Second, we should seek vegetation maps that can be used to legitimately further subdivide the biogeographical provinces into ecosystems comparable with those I have tentatively identified in the Afrotropical, Nearctic, and Neotropical realms. I would very much appreciate recommendations as to what vegetation maps and documentation might be appropriate for such use on a nation-by-nation or realm basis.

An Inventory of Wilderness Candidate Areas

Identifying ecosystem representation gaps within existing preservation-oriented protected area systems will be a major step in developing a well-rounded, world-wide network of protected areas. To be useful, however, we must simultaneously develop an inventory of potential wilderness or other protected area candidates. Without such an inventory it will be nearly impossible to match gaps in the system with opportunities to fill those gaps.

I am pleased to learn that Mike McCloskey, Chairman of the Sierra Club, has made a major step toward such an inventory of world-wide wilderness candidate areas (McCloskey 1987). We should all assist in refining and expanding Mike's work just as we work cooperatively to refine and expand the work I have sketched out.

THE NEXT STEP

From here we must refine and expand the classification of ecosystems throughout the world. Using these refinements as a starting place and then correlating existing preservation-oriented protected area systems with such classifications, we can analyze the needs for future designations. In doing so it would be helpful if we establish specific goals for each ecosystem we identify. To provoke discussion, I suggest that we seek the designation of at least one mega-reserve of more than 25,000 hectares and two meso-reserves of between 5,000 and 25,000 hectares within each ecosystem.

I propose that our immediate objectives be to: 1) agree on biogeographical province-vegetation ecosystem classifications for the entire globe, 2) identify preservation-oriented protected area system gaps within such classifications, 3) set goals for the number and size of preservation units within each ecosystem, and 4) evaluate the existing situation in time for a follow-up report at the Fifth World Wilderness Congress. At that time we could begin to develop specific proposals to integrate new wilderness designations in our existing

framework with the strongest possible justification for such designations.

OUR LEGACY, THEIR HERITAGE

What prouder natural resource legacy could we leave future generations and what richer natural resource heritage could they enjoy that a world-wide wilderness system that includes representation of all of the Earth's major ecosystems.

Ecosystem representation should be adopted as a criterion for wilderness designation throughout the world. Such action would show that our generation cares deeply for both our heritage and the legacy we leave for future generations. A fundamental charge to this generation should be to help ensure that our children and grandchildren may know and cherish the wonders of all our Earth's natural systems.

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APPENDIX A

Existing Situation By Biogeographical Region With Emphasis On The Afrotropical, Neotropical and Nearctic Realms

Appendix A lists protected areas of the Afrotropical, Neotropical and Nearctic realms in those IUCN categories that require at least some portion of the area to be under wilderness-type management: Categories I (strict nature preserves), II (national parks), and IX

(biosphere reserves). In addition, all designated and recommended wilderness areas are included for the United States. Areas are listed by biogeographical province, and most areas within the Afrotropical, Neotropical and Nearctic realms include information on vegetative types. Vegetative information would be welcomed by the author wherever such information is missing, regardless of realm. Comments on the accuracy of included data would also be appreciated.

Note

Since Appendix A consists of 61 pages, it was impossible to publish it in these proceedings. Copies are available from the author (George D. Davis, Chevre Hill Farm, Wadhams, NY 12990 USA) for \$10 (US) each. Data for any individual nation except the United States is available from the author at no cost.

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WILDERNESS LEGISLATION: A 200TH BIRTHDAY PRESENT FOR AUSTRALIA?*

JUDITH LAMBERT

AUSTRALIA: THAT VAST CONTINENT "DOWN UNDER"

Despite what our overseas advertising may have led you to believe, Australia is an urban nation. When first invaded by Europeans almost 200 years ago it was nearly all wilderness. Now the majority of Australians have never seen a wilderness.

With an area of more than 7.5 million square kilometers, Australia's population of only 16 million is largely concentrated in the State capital cities and smaller rural cities on the eastern perimeter. Australia is a huge continent, with a small urban dwelling population and one which by world standards is relatively affluent. What better opportunity to protect some of the world's rapidly disappearing wilderness?

Australia has a wide diversity of climatic, vegetation and habitat types. In the north-west are the spectacular gorges and rock formations of the Bungle Bungle massif and the Kimberley region. To the north escarpment country lies adjacent to the monsoon wetlands of Kakadu National Park. There are the vast quartz dunes of the Cape York peninsula, the wet tropical rainforest of north Queensland which lie adjacent to the world renowned Great Barrier Reef, eucalypt forests, semi-arid lands and alpine country in the south-east, cool temperate forests and spectacular mountain scenery in Tasmania's south-west and the vast arid lands of South and Western Australia (see map).

Just how much of this remains in wilderness condition is not really known. Only in the past 5-10 years have governments in

Australia listened to the growing number of individuals crying out for proper identification and management of the country's wilderness.

In 1976 the first survey of wilderness in Australia was published by Helman et al., who reported on a study of wilderness in eastern New South Wales and south-eastern Queensland. This was followed by a 1979 survey of Victoria by Feller et al. More recently, reports have been published for Tasmania (Hawes & Heatley, 1985), South Australia (Lesslie & Taylor, 1983) and just this year a new and more detailed study of Victoria has been completed (Preece et al., 1987)

Much of the country's wilderness remains unidentified and most is without adequate protection. Although several States and the Commonwealth make some provision for wilderness protection within National Parks or other land use legislation, this has been used only to a very limited extent and wilderness which lies outside existing National Parks is totally without protection.

Preliminary reports and estimates suggest that despite its vastness and diversity, as little as 5 to 10 percent of the land remains in wilderness condition and much of that does not even have the benefit of National Park status. Pastoral activities, mineral and petroleum exploration and mining, forestry industries and uncontrolled tourism all offer major threats to that which remains.

Land use in Australia is largely under the control of State and Territory governments and the Federal government has until recently shown a reluctance to intervene to protect

*in Krumpal, E.E. and P.D. Weingart, eds. 1992. Management of Park and Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

precious natural areas. Such intervention by the Federal government has had to rely upon Constitutional powers such as those vested in it to control exports and through Australia's participation in international agreements. These powers withstood High Court challenge by an environmentally irresponsible State government in the case against the building of a hydro-electric dam on the wild and spectacular Franklin River in Tasmania's south-west wilderness. They are, however, an inappropriate and at times inadequate method for protecting wilderness generally.

THIS MAY SOON CHANGE

In 1983 The Wilderness Society, encouraged by its public support and the victory over the Franklin dam, embarked upon a campaign of public education and research towards the introduction of wilderness legislation in all States and Territories, as well as federally.

Australia's bicentennial - 200 years of European settlement in which 90% of the country's wilderness has been destroyed - provided an ideal focus for this campaign. The primary aim of The Wilderness Society, and other conservation groups which have joined it in its efforts, is the introduction of the country's first Wilderness Act by the bicentennial year, 1988.

New South Wales (NSW), the State which for the past decade has led the way in protection of the natural environment, is the initial focus of this campaign.

As with all major Wilderness Society campaigns in Australia, this project advanced on several fronts:

*Research began to determine the areas of wilderness remaining in the State, their current status and the threats to them

*Negotiations with State government members and their departments began

*Public education leaflets, audio-visual presentations and other materials were prepared

*Fund-raising through merchandising of campaign-related goods, special events and donation appeals began

*Liaison with relevant media people was established.

As the campaign increased in momentum, the team of both paid and volunteer staff grew; public involvement increased.

The Wilderness Society perhaps more than any other national conservation organisation in Australia, is a "grass-roots" organization which relies heavily on the support of its members and the public for its campaign successes. People from all walks of life are drawn in to provide those skills which they feel best able to contribute. With each small success the credibility of the organization grows, so that it is now one of two or three non-government organizations whose opinions are sought by politicians, government departments and professionals in various fields impinging on the environment.

At the same time in 1985, a Wilderness Society representative and other individuals with relevant expertise were invited to participate in a Wilderness Working Group, set up by the State Minister for Planning & Environment:

*To examine the current status of wilderness in NSW and make recommendations on any action it considers necessary for the protection and management of such areas;

*To review the need for special legislation dealing with wilderness protection and management in NSW;

*To offer advice on the implementation of its recommendations.

That Working Group produced a report in May 1986, which among other things:

*Adopted the following definition of wilderness

"Wilderness area means a large tract of land with native plant and animal communities, not substantially modified by humans and their works, of sufficient area to make practicable its preservation and appropriate use in an unimpaired condition, and giving opportunities for solitude and recreation."

*Recognised that wilderness has important nature conservation, scientific, recreational and social values;

*Identified 36 areas in NSW which it considers to have wilderness value;

*Recommended that the state government protect and manage the state's remaining wilderness areas and wild rivers;

*Recommended the introduction of a Wilderness and Wild Rivers Management Act.

Once released, the report was available for public comment over a period of five months. During that time The Wilderness Society and other conservation groups provided a focus for thousands of people to make their submissions to the government.

Strongest opponents of the report, its recommendations and the proposed Wilderness & Wild Rivers Management Act were:

- *the four-wheel drive lobby
- *mining industry
- *forest industry

The National Parks & Wildlife Service, the body which would be responsible for administration of the Act, has disappointed conservation organisations by its reluctance to support the Wilderness Working Group's recommendation for a Wilderness Act.

Continued public pressure, political lobbying and media coverage of the issue, combined with a recent Federal election result which gave a mandate to governments willing to

protect the natural environment, make it seem likely that a Wilderness Act will go to State Parliament in the near future. It is not yet clear just what provisions the Act will contain, but the conservation movement is advocacy that it should:

*Set a timetable for the interim protection of wilderness areas;

*Provide for the permanent protection of the wilderness areas of the State, and their proper management;

*Require public authorities to fulfill duties designed to protect wilderness areas from damaging activities originating outside their boundaries;

*Require public authorities to provide information to assist the Director of the National Parks & Wildlife Service in the protection of wilderness areas and their proper management;

*Encourage and promote public education for the protection and proper management of wilderness areas;

*Entitle any person to take court action to uphold the provisions of the Act.

The Act would be administered by the Director of the National Parks & Wilderness Service, subject to the control of the Minister for Planning & Environment.

The passage of such an Act through Parliament would not only ensure the future protection and management of wilderness in New South Wales, it would also set a precedent for other States and should ultimately, with continued pressure from The Wilderness Society and other conservation organizations, provide for the development of a system of wilderness reserves across the nation.

We can only hope that the State Parliament in New South Wales will take up this challenge for the future benefit of all Australians and for those from other countries who come to see our natural heritage.

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THE DESIGNATION OF WILDERNESS IN BRITISH COLUMBIA*

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The year 1986 was a watershed for wilderness designation in British Columbia. After years of debate and intense public confrontations, decisions have been taken by the provincial government which have resulted in the creation of eight new wilderness areas, additions of wilderness areas to seven existing parks; agreement to create a new National Park Reserve, the strengthening of designations over two of the most important provincial wilderness parks and commencement of studies toward designation of at least five more potential wilderness areas. Perhaps more significant still is the adoption of wilderness legislation for Provincial Forests, and the commencement of a process which will, it is hoped, result in a provincial wilderness policy which integrates the planning of the agencies responsible for management of this resource. This paper provides an overview of the forces which shaped the debate, reviews the causes and results of recent actions, and considers the prospects for the immediate future. The opinions in this paper are those of the author.

BACKGROUND

Situated on Canada's west coast, British Columbia is certainly the nations' most geographically and biologically varied province. Sixteen natural regions and 52 landscapes have been recognized in a land area which, at 94,780,000 hectares, is larger than all the states in the United States with the exception only of Alaska. This province is twice the size of France and is richly endowed with natural areas

of worldwide significance many of which remain in an undisturbed state.

Typical of western North America two distinctly contrasted and increasingly conflicting forces shaped the socio-economic development of British Columbia. On the one hand its continued role as a producer and primary processor of natural resources was responsible for the creation of most communities - whether they be coastal canneries and lumber camps or interior mining and ranching towns. Those commercial resources generate by far the largest part of the provincial domestic product. On the other hand, the natural features have always attracted people to live in the province and, even one hundred years ago, tourism was thought to have great economic potential. The first parks were created and substantial investments in roads, railways, hotels and other services were made in expectation of a tourism boom. That boom was slow in coming but, as in other parts of the continent, tourism and the service sector is now the fastest growing sector of the economy, employing more people than any other industry.

GROWING CONFRONTATIONS

The pressure on a limited resource base grew to a point where the forest land was heavily committed, and every accessible stand of timber theoretically allocated for harvest. Exploration for minerals continually expanded. At the same time, tourism and in particular, wilderness tourism was finally achieving its potential. However, the tourist businesses dependent on that resource, argued that they could not guarantee the quality of experience which their guests sought because so little of the province was formally protected or managed for wilderness conditions.

*in Krumpke, E.E. and P.D. Weingart, eds. 1992. *Management of Park and Wilderness Reserves*. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

In 1985 the formally protected park and wilderness system included 4.64 million hectares or more than 4.8 percent of the total land area (an area larger than Switzerland). At more than one and three quarters of a hectare per resident, this was already the most favorable ratio of recreation land to population south of Alaska and Northwest Territories. In addition, vast areas of the province, five times the size of the park system, were regarded as de facto wilderness. Park and wilderness advocates argued that the lack of wilderness legislation seriously threatened that resource. Other resource users, however, expressed concern that the proposals for further wilderness were unrestrained, and that advocates wished to "lock-up" the province.

Several natural regions and special features of provincial, if not national significance, lay outside the park system. Wilderness advocates had further argued that even wilderness in the park system was not inviolate. Several of the largest parks, amounting to more than one-third of the land area in the system, had old resource tenures, and some parks were even, theoretically, open to further resource uses.

As the province entered the period of economic recession and uncertainty of the early and mid-nineteen eighties, these disparate social, economic, historic and natural resource issues coalesced into a series of confrontations which initially appeared to be no different from similar area-specific battles which had been fought in the past. Underlying each of these, however, were a number of changes which are only now being understood.

FACTORS OF CHANGE

A change in the Economic Base of the Province

The traditional resource industries became less profitable and dramatically reduced employment in the face of international competition for changing and shrinking markets.

While this was occurring, tourist use increased as such unrelated international forces as worldwide terrorism, acid rain, a declining

Canadian dollar, increased interest in wilderness and a "Super Natural B.C." advertising campaign made British Columbia attractive to visit. Increasingly, growth in tourism focused on the province's varied and spectacular natural resources. However, the tourist industry argued that the historic commitment of a substantial portion of the land base to resource industries effectively limited the evolution of this other use.

An Informed and Concerned Public

The environmental activism of the sixties and early seventies seemed to decline with the onset of the recession. In fact it now appears that interest in, and concern for, the environment has become ingrained into the public psyche. Recent surveys have shown that Canadians are prepared to accept lower standards of living in order to protect the environment and, that they consider environmental issues to be among the most important matters with which government has to deal. Many Canadians choose to live in British Columbia because of its environment, and consequently, they were prepared to oppose any perceived threats to environmental quality.

Public advocates argued that there was no formal mechanism for public involvement in land allocation decisions to resolve the resource issues.

Land Issues

Citizen advocacy groups and academics had predicted that the competition for a limited resource base would result in the economy experiencing significant problems as the limits to growth were reached. As those limits became clearly discernible, changes in land allocation became extremely difficult. In the absence of comprehensive provincial policy statement on the planning of any one of the essential resources, the emphasis in decision-making was a site specific issues often resulting in hostile, adversarial, no win contests between supporters of commercial resource utilization and parks and wilderness groups.

By nineteen eighty-five there were approximately twenty-five significant

unresolved proposals for new wilderness areas and the boundaries of a number of areas, previously set aside for wilderness protection, were being reconsidered. Areas such as South Moresby and the Stein were becoming household names, not so much because of their natural values, but rather because of the acrimonious debate over their future management. Affected were over four million hectares of wilderness.

CRITICAL ISSUES RESTRAINING CHANGE

There were a number of factors which made it particularly difficult for government to take action.

Information about Resource Value

The mining industry was concerned that in setting aside new wilderness lands, opportunities would be lost to find mineral or hydro-carbon deposits of potentially significant economic worth. Wilderness advocates, however, considered the process of exploration, which gave the mineral tenure holder a long term interest in the land base, essentially preventing the government from allocating the area to other uses, potentially physically destructive. A compromise solution, such as that found in the 1964 U.S. Wilderness Act, was required.

Without a publicly stated provincial policy on wilderness, or a park system plan, industry was in the position of being uncertain as to the limits to growth for this particular land hungry resource use. Quite beyond the issue of the relative value of wilderness vis-a-vis other resources, there appeared to be no end to the wilderness proposals emanating from public advocates.

Conflicting Opinions about Public Desires

The rapid evolution of public opinion was not initially well understood. Accustomed to dealing with a relatively few very outspoken wilderness advocates, the government did not initially sense the strong groundswell of support which was building on certain issues and which extended well beyond the membership of the

traditional wilderness advocacy groups and, significantly, now involved native groups.

The government was, in any case, caught in a cross-fire since representatives of the resource industries were very clearly concerned that any further alienation of the land base from commercial resource extraction would impair their long-term ability to carry on business.

Previous Legal Commitments

Further complicating the situation in many areas was the legacy of historic decisions committing resources for industrial use. Some of these had been made more than half a century ago, and in some instances whole communities or particular industries had come to depend on the availability of a particular resource. The direct cost of compensation, should an area be set aside as wilderness, was easily measured for the forest industry, and in the case of one proposal alone was in excess of twenty million dollars. In the case of mineral interests on the other hand, the costs could only be guessed at but were predicted to extend into the millions of dollars.

For a government facing dramatic reductions in revenues and exceptional increases in costs of unemployment, health and social services, there was concern about assessing the costs of compensating legitimate tenure holders in wilderness areas. Many people argued that by setting aside land in wilderness now, future options for valuable commercial resources were being lost. At the same time it was clear that the heated debate and public pressure was creating a situation which resulted in a great deal of uncertainty which, when added to the general world economic situation, made it difficult for industry to continue to do business.

THE FORCES OF CHANGE

A limited number of factors finally resulted in the government taking action:

It was clear that the issues had become highly political and that some decisions were necessary. Respected leaders of public opinion from an array of backgrounds, interests and political affiliations, began to campaign both

publicly and privately for increased protection of wilderness. Influential supporters of the government proposed resolutions which included increases in the provincial wilderness system.

Media interest intensified and coverage moved from local and largely print oriented, to national and then international, involving both print and electronic coverage. Public opinion was clearly being altered.

Finally, industry needed decisions or there would be increased unemployment and loss of investment in a number of small communities around the province.

THE AGENT OF CHANGE

While it was seen that action was necessary, because issues raised in the years of debate were still not resolved in the public forum, the options were clouded. Arguments raged continuously on both sides of the pro and con wilderness debate. For a government seeking to make the best choice in the public interest, this had become a very difficult situation.

A decision was made in November 1985, to establish a special committee of appointed public representatives, the Wilderness Advisory Committee (W.A.C.). This proved to be the decision which broke the impasse. The W.A.C. was charged with reviewing twenty-four areas which included eight existing provincial parks and two proposed national parks. They were to make recommendations, within three months, on whether any or all of the areas should be protected as wilderness.

The composition, mandate and time frame for the committee were initially strongly opposed by conservation groups, some of which chose to abstain from the work of the Committee throughout its short existence. Their concerns resulted in one critical change; a representative of conservation interests was added to the initial membership which had been drawn from academia (3), from unions (1), mining industry (1), forest industry (1) and legal profession (1).

Ironically, given the early opposition and continued suspicions of many, the W.A.C. focused public discussion and resolution of the issues. It can be argued that the composition, mandate and time frame all contributed significantly to successful completion of a consensus report which resulted in changes to the way in which wilderness is defined today as well as an increase in the acreage protected.

The final composition of the committee gave it credibility with resource industries, unions, and most public groups. The fact that all members were committed to their task and that the capable and experienced chairman and support staff were able to successfully and correctly influence the review of issues, ensured impartial treatment of the evidence which was presented. That independence and impartiality was crucial.

The short time frame, three months from start to finish, was established because it was clear that over the years of debate concerning most of these specific areas, all necessary and reasonably available resource data for a land use decision had in fact been assembled. It remained only for an independent jury to hear the evidence and consider their verdict. Three months proved to be a sufficient but tight enough time that there was no opportunity for intellectualizing, second guessing or politicking.

The mandate was specific to the study areas but allowed some latitude as to how to proceed and present the final analysis. It permitted public involvement which allowed all concerned citizens and groups to address the Committee and argue their case. The mandate also ensured that the Committee had access to key agency staff, knowledge and information. As a result it was in a position to view the entire government process, and recommend any necessary changes. The Committee therefore decided to deal with not only the specific areas, but also the state of planning for, and protection of, wilderness throughout the province.

For all these reasons the Committee was able to find acceptable compromises on the crucial factors of:

1. Limits to expansion of the Wilderness system:

The Committee was not responsible to produce a provincial wilderness plan, but it is clear that the existence of a draft park system plan which outlined the limits to growth, greatly influenced the Committee. It was recommended that the system plan should be publicly reviewed and an integrated wilderness plan developed as part of a series of recommendations on legislatively protecting wilderness.

2. Adequate inventory of sub-surface resource values:

The Committee proposed that it was necessary to obtain information about all resource values before final commitments to total protection. They pointed out however, that changes were necessary in the current system of mineral tenures and recommended that temporary tenures of twenty years should be allowed after which, unless a mine were in production, all tenures would be surrendered without compensation. During that period proposed parks would be designated as Recreation Areas.

3. Dealing with prior commitments in areas of high conservation value:

The committee acknowledged the existence of these and recommended to government various options for proceeding to either purchase, compensate the tenure holders, or permit careful development. In so doing they produced no new solutions but they did confirm that action was necessary, however, they also proposed that whole communities should be compensated as well as tenure holders.

4. Dealing with future uncertainty:

The Committee recognized that while wilderness may be the highest and best use for land today society may require that resource for another purpose in future. It therefore proposed that review of areas and boundaries should be an

officially recognized procedure in future so that changes in societal needs could be accommodated.

These compromises made it possible for W.A.C. to recommend an increase in the wilderness system by proposing an addition of some one million hectares to the federal and provincial park system. They made proposals on how to deal with pre-existing tenures in existing parks and confirmed protection of approximately two and a half million hectares to the federal and provincial park system. Recommendations were also made for legislative protection of wilderness and changes in both types of land designations and in the process for reviewing areas proposed for designation.

Many of the W.A.C. recommendations have been criticized by both industry and conservationists, which is probably a measure of how successfully the Committee walked the tightrope of constructive impartiality; but the greatest measure of success is in how many of the recommendations have been acted upon and in the changes which will result in the way in which wilderness is protected.

The Provincial Government accepted the Committee's recommendations in principle, and in so doing also accepted the compromises on the four crucial factors. As a result, of the twenty-four areas addressed by the Committee the government has now made and announced decisions on twenty. Seven have become new Recreation Areas and will, when mineral evaluation is completed, be eligible to become Parks if no significant minerals are found; two are being officially added to National Park Reserves; four have been added to existing parks; four other park boundaries have been amended to exclude pre-existing tenures and re-classify the remaining land has been reclassified as Provincial Park removed from any further commercial use (these have been the most controversial actions because existing tenures have been recognized); acquisition of three Ecological Reserve tenures has been approved.

Only four areas have yet to be dealt with, including two of the most controversial¹.

The Government has chosen not to pass a wilderness act but instead to adopt the New Zealand system, by amending existing legislation and issuing a wilderness policy. There will now be two Acts under which wilderness may be designated. The Park Act establishes Provincial Parks which are free of all commercial resource tenures, and Recreation Areas which are transitions to parks where pre-existing tenures or, temporary mineral evaluation is accommodated for a minimum of 10 years. Legislative amendment to the Mineral Act has been necessary to do this. At this time, there will be no new claims registered. The Forest Act has been amended to allow Forest Wilderness Areas which are free of commercial forest harvesting but open to continuous mineral evaluation and development.

A new wilderness policy is in preparation. This will include development of wilderness plans as well as an amended process for review and designation of candidate areas, and a protocol has been developed on how mineral exploration will be accommodated in Recreation Areas.

THE FUTURE

The events of the last eighteen months have reshaped the wilderness system of the province. They have also begun the longer and more challenging process of changing wilderness legislation and policy.

The cost of establishing Wilderness is now more clearly established. In the case of South Moresby almost one hundred million dollars has been required to compensate existing rights and resident lifestyles and create a new tourist industry. The price established may prove too high for some other areas and this solution to today's problems of prior commitments may not work in all situations. Mineral evaluation will proceed for at least ten years in new Recreation Areas but forest Wilderness Areas will be available for normal mineral claim staking and exploration.

The question of a wilderness system plan is still a serious challenge. In the emotional debate questions remain as to how to solicit public

opinions and whether the traditional advocacy groups will accept the same limits to growth which the resource industry has now had to face. Integration of the wilderness resource into a total provincial land use plan will surely be the most critical step of all.

British Columbia now has the most extensive designated wilderness system outside Alaska. Increasingly, questions of designation will focus on the wilderness lying within Provincial Forests. Given the small resident population the continued protection of quality wilderness clearly depends on tourism, but management of tourist use and the allocation of tenures for wilderness business, has yet to be addressed. Managing the interplay of traditional uses, particularly native users, and these new industries has also only just begun. We will have to do a better job of integration of wildlife and other natural resource management needs in these wilderness islands located in the wider sea of resource management, if the hard won gains we have made in the twentieth century are not to be eroded in the twenty-first.

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ALASKA: NATIONAL PARK SERVICE WILDERNESS REVIEW*

LAWRENCE E. BEAL AND SANFORD P. RABINOWITZ

ABSTRACT:

The National Park Service's Alaska wilderness review is well underway with 18 million acres, in 13 parks, being considered for wilderness designation. The Alaska Wilderness review is one of the largest wilderness reviews the National Park Service has ever undertaken.

This paper describes the current status of the wilderness review and provides an explanation of upcoming milestones for the project. In addition, the paper discusses wilderness management in Alaska and how it is managed differently than in the contiguous 48 states. The paper also reviews the range of alternative recommendations being considered by the National Park Service and the impacts on park resources, recreation uses and opportunities, subsistence uses by local rural residents, access to and within areas, and possible future developments in and near the parks.

This paper also briefly reviews the 1964 Wilderness Act and the 1980 Alaska National Interest Lands Conservation Act (ANILCA) in which Congress established 33 million acres of wilderness in ten new and three expanded park areas in Alaska.

KEY WORDS: Wilderness, Wilderness Preservation System, Alaska, national parks

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INTRODUCTION

The National Park Service's Alaska wilderness review is well underway with 18,000,000 acres (7,284,500 hectares), in 13 parks, being considered for wilderness designation. The Alaska wilderness review is one of the largest wilderness reviews the National Park Service has ever undertaken. Despite the twenty year trend of adding wilderness to the National Wilderness Preservation System, there may be strong resistance in Alaska to designating more land as wilderness.

Currently, there are 33,000,000 acres (13,354,900 hectares) of wilderness in Alaska's 54,700,000 acres (22,136,800 hectares) of national parks. Ninety per cent of the designated wilderness in the national Park System is in Alaska. These designated wilderness areas are managed according to the provisions of the 1964 Wilderness Act (16 U.S.C. 1131-1136) and provisions from the Alaska National Interest Lands Conservation Act (ANILCA, 94 Stat. 2371) which modify implementation of the Wilderness Act in Alaska.

The State of Alaska is one fifth the size of the 48 contiguous states combined. From east to west Alaska spans 3,000 miles (4,800 kilometers). Less than one percent of the State's 375,000 acres (151,760,000 hectares) are developed. Vast portions of the State have all the characteristics of wilderness; however, to gain legal status as wilderness requires Congressional designation. The wilderness review and impending recommendations are focusing local, state, and national interest on the National Park Service's Alaska wilderness review.

The Alaska National Interest lands Conservation Act and the Wilderness Act

ANILCA was adopted by Congress in 1980 "to preserve for the benefit, use, education, and inspiration of present and future generations certain lands and waters in the State of Alaska that contain nationally significant natural, cultural, recreation, and wildlife values." ANILCA, sec 101 (a).

The Wilderness Act of 1964 declares that it is "the policy of Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." Wilderness Act, section 2 (a).

The Wilderness Act established the national Wilderness Preservation System which is composed of federally owned areas designated by Congress as "wilderness areas." These areas "shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for gathering and dissemination of information regarding their use and enjoyment as wilderness...." Wilderness Act, section 2 (a).

The Wilderness Act also identifies the process to review, recommend, and designate new lands to become part of the Wilderness Preservation System.

Management of Existing Wilderness Lands

It is the policy of the National Park Service to manage designated wilderness areas for the use and enjoyment of wilderness values without impairment of the wilderness resource. In the management and use of wilderness lands, the Park Services uses the minimum tool necessary to successfully accomplish its management objectives.

Park Service management of wilderness lands in Alaska is different than in other states. Although management principles originate in the Wilderness Act, they are modified by ANILCA for Alaska national parks. Various uses and

activities are allowed in Alaska wilderness areas which are prohibited in other states.

Two clear differences between Park Service practices elsewhere in the United States and those in Alaska relate to access to and within wilderness areas and subsistence activities. Snowmachines, motorboats, and airplanes are not typically allowed in wilderness areas. In Alaska, the opposite is the case because of special provisions of ANILCA. All three are permitted to operate in wilderness areas and are commonly used. Similarly, subsistence activities, like hunting and trapping, are not normally allowed in parks, but in Alaska subsistence activities are common in most areas.

In addition, ANILCA modifies other activities such as park boundary adjustment, subsistence access to inholdings, and cabin use. These modifications have required the National Park Service to adopt different wilderness management practices in Alaska to accommodate the legal mandates of ANILCA while still maintaining the wilderness character and values of Alaska's national parks.

The management of subsistence activities is generally the same for wilderness areas as non-wilderness areas in Alaska. ANILCA specifically provides for the opportunity for local rural residents to continue a subsistence way of life. ANILCA also specifies that the use of public lands should have the least adverse impact on rural residents who depend upon subsistence resources, that subsistence use of resources be given preference over other consumptive uses, and that federal land managing agencies shall cooperate with adjacent landowners in managing renewable resources.

One management technique used by the National Park Service to resolve conflicts with existing uses and wilderness management is to exchange Park Service managed lands with Alaska Native Corporation lands. Land exchanges provide a mechanism to allow for subsistence or other activities which could have detrimental effects on wilderness resources to occur outside of the park and wilderness boundary. The National Park Service gains

valuable wilderness lands adjacent to existing wilderness in exchange for lands that have high value for other activities.

This type of land exchange was made in Cape Krusenstern National Monument in 1985. In this trade, Park Service managed lands were exchanged for Native Corporation lands and an access road easement. Congress approved this land exchange to provide access to a world-class zinc mine on private land and to provide resource protection for several drainage systems in the Monument.

WILDERNESS REVIEW

The National Park Service began the wilderness review process in 1984 by reviewing non-wilderness Park Service administered lands to determine which lands qualified for wilderness designation. The definition of wilderness is summarized by the following: "in contrast with those areas where man and his own works dominate the landscape, ... an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain, ...an area of undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation, ...generally appears to have been affected primarily by the forces of nature, with the imprint of man's work is substantially unnoticeable; has outstanding opportunities for solitude or a primitive and unconfined type of recreation...." Wilderness Act, section 2(c).

Completed in 1986, the suitability review found approximately 18,000,000 acres (7,284,500 hectares) of the 21,000,000 acres (8,498,500 hectares) suitable for wilderness. The National Park Service is now studying these 18,000,000 acres (7,284,500 hectares) to determine which land should be recommended to Congress for designation as wilderness. Park Service recommendations will be reviewed and forwarded to Congress by the President.

Issue Identification

Issues and concerns about wilderness were identified through a series of public

"scoping" meetings that were held in over 40 cities and villages throughout Alaska. Alaska Native corporations, businesses, interest groups, state and federal agencies and individuals were invited to formal and informal sessions. Park Service planners presented basic information about the wilderness review, including individual maps of each park which illustrated the range of alternatives.

To tailor presentation methods to individual communities the Park Service held formal meetings in some communities, with a structured format of a presentation followed by a question and answer and comment period. In other communities it was more productive to discuss issues informally with less structure, thereby providing for more give and take between participants and planners.

All meetings were designed to inform local residents about the wilderness review, to answer their questions, and to listen and record their concerns. The public meetings allowed people of diverse backgrounds and interests to better understand issues that may affect them and to communicate their concerns to the Park Service. Hundreds of hours of discussion and debate followed the meetings. people were concerned about the effects more wilderness lands might have on subsistence uses, travel to and across wilderness with motorized vehicles, and the economic effects of additional wilderness lands.

Following the meetings, the planners reviewed information and consolidated the meeting records into lists of issues and concerns. later, an interdisciplinary team of park staff, planners, and resource specialists met to determine which subjects were to be addressed in the 13 environmental impact statements.

Alternatives

The Park Service planning team then established criteria and developed alternative wilderness recommendations for each of the 13 park areas. In general, there are four alternatives ranging from no additional lands being recommended to recommending all

possible lands in the study area for wilderness designation.

Alternative 1: "No Action" Alternative 1 represents the continuation of existing policies. There would be no new lands recommended for wilderness.

Alternative 2: "Partial-Limited" Alternative 2 recommends that most land would not be recommended for wilderness to allow for greater management flexibility in providing a broad range recreation opportunities and in the location of possible visitor facilities.

Alternative 3: "Partial-Majority" Alternative 3 recommends that the majority of lands within the unit be designated as wilderness. Areas that are less suited to be managed as wilderness and areas that have development potential would not be recommended for wilderness designation.

Alternative 4: "Maximum Wilderness" Alternative 4 recommends the maximum amount of federal lands for wilderness designation.

Impacts of Wilderness Designation

Currently the Park Service is evaluating the impacts of the alternatives on park resources, recreation uses and opportunities, subsistence use by local rural residents, access to and within areas, and possible future development in and near the parks. Developing a complete understanding of the impacts of wilderness designation in Alaska's National Parks requires substantial research and review by the Park Service. Although that work is not yet complete, some impacts are clear at this time.

In wilderness areas the National Park Service would not have the option to develop most visitor facilities. Wilderness designation would prohibit the Park Service from building visitor centers, hotels, restaurants, gas stations, roads, interpretive exhibits, and picnic areas. Wilderness designation would have the long

term effect of limiting the type, size, number, and location of visitor facilities in park areas. Wilderness lands are less likely to change than adjacent non-wilderness lands.

Existing and prospective park concessionaires would be prohibited from constructing any new facilities in support of their commercial activity. Although some new cabins could be built for health and safety, subsistence, or administrative purposes, no other cabins would be allowed.

Off road vehicles (ORVs) and all terrain vehicles (ATVs) would not be allowed unless their use had been previously approved by the National Park Service. Motorized equipment or vehicles not expressly authorized by ANILCA would also be prohibited in areas where their use is now allowed.

Wilderness management also affects the opportunity for subsistence activities in park areas. There are likely to be fewer conflicts with subsistence activities in wilderness areas. Local rural residents would benefit because hunting, trapping, and gathering activities depend upon undeveloped, natural lands. However, there are possible restrictions on the use of certain motorized equipment, such as chainsaws and ice augers. These possible restrictions may be seen as undesirable limitations to subsistence users.

The wilderness review has already generated debate in Alaska. Various groups, corporations, the State of Alaska, and individuals are joining in discussions over the recommendations which will be presented to the public. Alaska's State Senate has begun debate on Senate Joint Resolution 17, which states that no more wilderness should be designated in the State of Alaska.

There is also concern about the effects of wilderness designation on new mineral and oil and gas exploration and development. However, unlike other federally managed lands where wilderness designation restricts new exploration and development, all park lands are already closed to new mineral and oil and gas exploration. Others raise the issues of

preservation versus conservation, short-term versus long-term effects of wilderness lands, and the economic effects that more wilderness could bring about in a state which already has more designated wilderness than any other.

The Wilderness Review receives substantial media coverage. Alaska's sophisticated electronic media quickly transmit stories to a statewide network of public radio and television stations. In Alaska even the smallest village is connected to this network via satellite earth stations.

Status - Upcoming Milestones

The National Park Service will issue 13 draft Environmental Impact Statements (EISs) in 1988 that will include draft proposed wilderness recommendations. These documents will include descriptions of the alternative wilderness recommendations and analyses of the environmental impacts of the proposals to be forwarded to Congress.

Park Service planners will then analyze the public comments, respond to all comments, revise the proposed actions and impact analyses as necessary, and prepare the final EISs. The final EISs and records of decisions are presently scheduled for release to the public in 1988 or 1989.

CONCLUSION

As the Park Service planning team continues to refine and analyze the draft alternatives, questions as to the real effects of wilderness recommendations will continue. Many Alaskans wonder why the National Park Service is even considering additional wilderness recommendations because of the perception that so much of the State already has been designated wilderness or has wilderness characteristics.

These questions and perceptions will continue to be addressed throughout the wilderness review. The National Park Service will continue to carry out the Congressional mandate to review lands for wilderness designation. In accordance with Park Service

policy and regulations, public hearings will be held on the draft wilderness recommendations.

The determination of the true effects of wilderness designation is not a refined science. It is an art that attempts to forecast conditions not just five or ten years in the future, but thirty to forty years hence.

In preparing the EISs, the Park Service planning team must make assumptions about future economic conditions and possible future development to provide decision makers with information on which to base their decisions. These assumptions and development scenarios, when reviewed and refined through a public review process, are the only method to predict the possible effects of wilderness designation.

The National Park Service is preparing the most objective documents possible while keeping the general public and affected communities informed about the progress of the study and the effects of wilderness designation.

To keep informed about the status of the National Park Service Wilderness Review in Alaska, or to obtain more information, contact the national Park Service at the following address:

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WILDERNESS STUDY COMPARISONS IN TWO COUNTRIES*

KERRY J. DAWSON

ABSTRACT

Some of the most important considerations in Advance Planning for Wilderness Areas are governmental management guidelines, resource information, management commitment, and ability to implement findings. Discussed in this paper are comparisons of a study team working in Peru and the United States on the ease with which interim management plans for wilderness designation can be completed and implemented. Particular emphasis will be placed on how two different governments deal with indigenous human populations, resource harvest or extraction, reclamation of altered environments, plans for endangered species, pressures for economic development, facilities and road improvements, implementation of rules and regulations, and funding priorities. In comparing the process as experienced in each country, it is a primary goal to also discuss similarities as well as differences in land tenure, government action, and citizen participation.

Professor Kerry J. Dawson, head of a team from the University of California at Davis, spent the spring and summer of 1984 as a Fulbright-Hays Research Scholar to a new Peruvian National Parks and Wilderness Program. He has spent several years heading study teams on similar projects in the United States. In all, sixteen conservation areas are discussed, eight in Peru and eight in the United States.

*in Krumpke, E.E., & P.D. Weingart, eds. 1992. *Management of Park & Wilderness Reserves*. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

INTRODUCTION

The new national parks and wilderness program in Peru is an attempt to develop areas where recreation is an integral part of park conservation activity. The old line national parks program in Peru is dominated by archaeological preserves, natural areas and wildlife reserves where visitors are largely unwelcome and very restricted use management prevails. This program should and will continue in the Peruvian Ministries of Agriculture and Archaeology with the new program beginning in the Ministry of Tourism.

Eight areas were master planned by the UC Davis team including the Colca Canyon (twice as deep as the Grand Canyon and a wilderness reserve for the Andean Condor and Vicuna as well as an archaeological reserve), Albufera (a coastal lagoon natural area), Rio Chanchamayo (a selvan or high jungle wild scenic river), the Rio Tambopata (a low jungle river reserve), Mcchu Picchu Reserve (a cultural reserve but also a natural area for the spectacled bear), Lurin Valley (a cultural reserve), Nazca Lines (a cultural reserve), and the Quistococha natural area for the Amazon freshwater dolphin (Figure 1).

The eight United States parks and conservation areas planned by teams headed by Professor Dawson include the Pine Forest Range Wilderness Study Area in Nevada, Rainbow Valley Management Area in Arizona, Van Duzen National Wild and Scenic River in California, Jacks State Wild and Scenic River in Georgia, Altamaha Waterfowl Management Area in Georgia, the UC Davis Putah Creek Campus Reserve in California, and the Jepson Prairie Natural Area in California (see Figure 2).



Peru

RESERVAS TURÍSTICAS NACIONALES

ZONAS DECLARADAS

| DPTO DE AREQUIPA | DPTO DE CUSCO | DPTO DE ICA | DPTO DE LIMA |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Arequipa 1. Arequipa 2. Arequipa 3. Arequipa 4. Arequipa 5. Arequipa 6. Arequipa 7. Arequipa 8. Arequipa 9. Arequipa 10. Arequipa | Cuzco 1. Cuzco 2. Cuzco 3. Cuzco 4. Cuzco 5. Cuzco 6. Cuzco 7. Cuzco 8. Cuzco 9. Cuzco 10. Cuzco | Ica 1. Ica 2. Ica 3. Ica 4. Ica 5. Ica 6. Ica 7. Ica 8. Ica 9. Ica 10. Ica | Lima 1. Lima 2. Lima 3. Lima 4. Lima 5. Lima 6. Lima 7. Lima 8. Lima 9. Lima 10. Lima |



CONSERVATION PLANNING

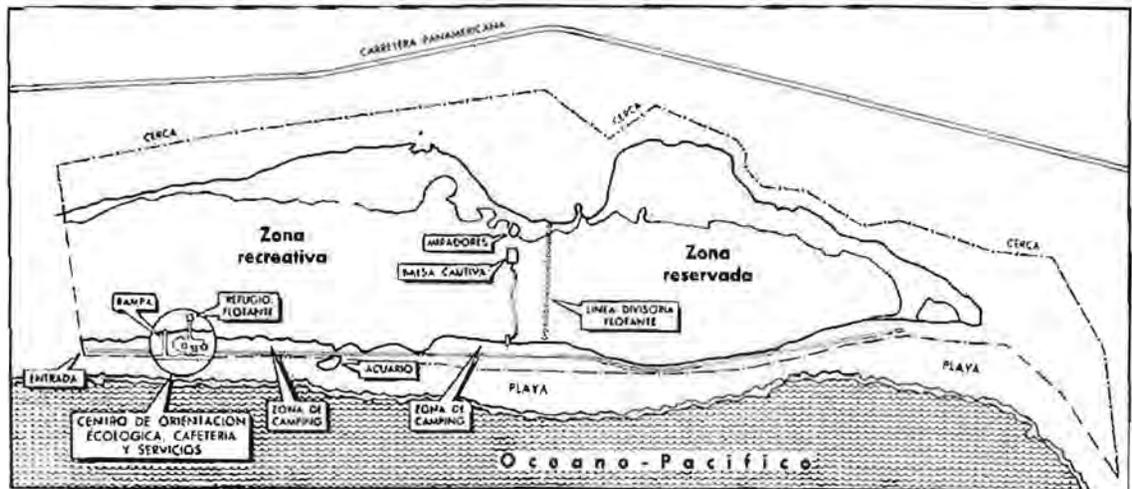
Planning should be a comprehensive process. That is, due consideration should be given to all factors including natural resources inventories, human activity, the form giving act of environmental design, and the full range of project implementation strategies. This process can be thought of as a continuous planning wheel where all factors feed continuously to a solution, the central goal of the process (Figure 3).

This central goal of the process is most often realized with a plan (Figure 4) while supporting information and text is sometimes produced. In the instance of the planning projects in the United States, all had published major reports as a final project (Dawson 1987, 1986, 1983, 1981, 1980, and 1978). In Peru, only Quistococha had a major report as a final product but five projects had minor reports as justification at the beginning of the projects (Dawson 1984). In the United States, pre-planning justification is usually in memo or budget sheet form. This reflects a difference in the approach to these sixteen planning projects where, in the United States, the planning process guided decision making while in Peru, decision-making guided the planning process.

STUDY COMPARISONS

To simplify study comparisons, a matrix was developed to rate the effectiveness of each planning project in its attention to details concerned with natural resource inventories, human use, environmental design, and project implementation. Categories from Figure 3 were placed in a matrix opposite Peru and USA projects with a scale of 1 to 10 used to rate effectiveness (Figures 5 and 6). Either matrix can be read for individual projects in relationship to individual factors in the planning process (the box scores), can be read on an overall individual planning factors scale by country (right hand totals column), or can be read as an overall individual project planning effectiveness scale (totals on bottom line).

In terms of resource inventories, these categories are probably the best addressed issues in the planning process, although severe deficiencies occur in both countries. In only one project, Jepson Prairie, was detailed site information available on all critical species (Figure 7). Ecological mapping is the most deficient, while Peru particularly has a problem with topographic maps. Because mapping is a function of the military, in Peru access can be limiting. Geological information was the most readily available for both countries.



| | Colca Wilderness Interim Plan | Nazca Visual Resources Management Plan | Tambopata Waterway Management Plan | Chanchamayo Wild and Scenic River Plan | Machu Picchu Cultural Reserve Plan | Lurin Resources Management Plan | Albufera Recreation Area Plan | Quistococha Natural Area Plan | TOTALS |
|--------------------------------------|-------------------------------|----------------------------------------|------------------------------------|----------------------------------------|------------------------------------|---------------------------------|-------------------------------|-------------------------------|--------|
| NATURAL AND PHYSICAL SCIENCES | | | | | | | | | |
| Topographical Sciences | 10 | 7 | 3 | 4 | 10 | 9 | 6 | 5 | 54 |
| Hydrological Sciences | 10 | 5 | 6 | 6 | 10 | 7 | 8 | 9 | 60 |
| Climatological Sciences | 8 | 5 | 7 | 8 | 10 | 8 | 5 | 7 | 58 |
| Ecological Sciences | 5 | 5 | 7 | 4 | 6 | 4 | 7 | 5 | 43 |
| Geological Sciences | 10 | 8 | 7 | 9 | 8 | 8 | 8 | 6 | 64 |
| BEHAVIORAL SCIENCES | | | | | | | | | |
| Sociology - Present | 4 | 6 | 5 | 5 | 9 | 5 | 4 | 5 | 43 |
| Sociology - Future | 1 | 2 | 4 | 3 | 8 | 3 | 8 | 10 | 39 |
| Physiological and Medical | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 12 |
| Community and Aesthetics | 8 | 2 | 3 | 2 | 9 | 7 | 8 | 9 | 48 |
| Communications | 7 | 4 | 5 | 3 | 8 | 6 | 2 | 8 | 43 |
| ENVIRONMENTAL DESIGN | | | | | | | | | |
| Technology and Infrastructure | 5 | 3 | 8 | 6 | 9 | 5 | 7 | 10 | 53 |
| Historic Preservation | 9 | 8 | 6 | 4 | 9 | 8 | 5 | 3 | 52 |
| Long Range Planning | 5 | 4 | 6 | 4 | 8 | 7 | 9 | 10 | 53 |
| Landscape Planning | 3 | 1 | 2 | 1 | 6 | 5 | 8 | 9 | 35 |
| Architecture | 7 | 6 | 6 | 7 | 8 | 6 | 9 | 10 | 59 |
| IMPLEMENTATION | | | | | | | | | |
| Economic | 8 | 6 | 6 | 4 | 9 | 6 | 5 | 10 | 54 |
| Legal | 4 | 3 | 5 | 4 | 8 | 2 | 8 | 9 | 43 |
| Political | 8 | 7 | 4 | 3 | 10 | 5 | 9 | 9 | 55 |
| Administrative | 4 | 3 | 3 | 3 | 8 | 2 | 6 | 7 | 36 |
| Managerial | 2 | 1 | 2 | 1 | 8 | 4 | 5 | 6 | 29 |
| TOTALS | 117 | 88 | 95 | 82 | 163 | 109 | 128 | 149 | |

| | Pine Forest Wilderness Interim Plan | Rainbow Valley Visual Resources Management Plan | Van Duzen Waterway Management Plan | Jacks Wild and Scenic River Plan | Altamaha Cultural Reserve Plan | Putah Creek Resources Management Plan | Brannon Island & Franks Tract Recreation Area Plan | Jepson Prairie Natural Area Plan | TOTALS |
|--------------------------------------|-------------------------------------|-------------------------------------------------|------------------------------------|----------------------------------|--------------------------------|---------------------------------------|----------------------------------------------------|----------------------------------|--------|
| NATURAL AND PHYSICAL SCIENCES | | | | | | | | | |
| Topographical Sciences | 10 | 10 | 10 | 10 | 8 | 9 | 8 | 10 | 75 |
| Hydrological Sciences | 9 | 10 | 10 | 9 | 10 | 10 | 9 | 10 | 77 |
| Climatological Sciences | 9 | 10 | 10 | 9 | 10 | 10 | 10 | 10 | 78 |
| Ecological Sciences | 6 | 7 | 7 | 7 | 7 | 6 | 7 | 9 | 56 |
| Geological Sciences | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 80 |
| BEHAVIORAL SCIENCES | | | | | | | | | |
| Sociology - Present | 10 | 7 | 10 | 8 | 10 | 10 | 10 | 10 | 75 |
| Sociology - Future | 7 | 5 | 8 | 7 | 10 | 6 | 10 | 8 | 61 |
| Physiological and Medical | 9 | 4 | 6 | 3 | 8 | 8 | 10 | 6 | 54 |
| Community and Aesthetics | 9 | 9 | 8 | 2 | 8 | 9 | 9 | 5 | 59 |
| Communications | 9 | 9 | 10 | 4 | 9 | 8 | 9 | 5 | 63 |
| ENVIRONMENTAL DESIGN | | | | | | | | | |
| Technology and Infrastructure | 9 | 9 | 8 | 6 | 9 | 9 | 9 | 4 | 63 |
| Historic Preservation | 10 | 10 | 9 | 6 | 10 | 10 | 10 | 6 | 71 |
| Long Range Planning | 9 | 7 | 10 | 7 | 10 | 10 | 10 | 10 | 71 |
| Landscape Planning | 10 | 8 | 7 | 6 | 10 | 10 | 10 | 10 | 71 |
| Architecture | 9 | 9 | 8 | 8 | 9 | 9 | 9 | 7 | 68 |
| IMPLEMENTATION | | | | | | | | | |
| Economic | 9 | 9 | 7 | 1 | 8 | 9 | 7 | 6 | 59 |
| Legal | 10 | 10 | 9 | 5 | 8 | 10 | 9 | 8 | 70 |
| Political | 8 | 7 | 6 | 7 | 6 | 10 | 10 | 8 | 62 |
| Administrative | 9 | 8 | 5 | 8 | 7 | 9 | 9 | 5 | 60 |
| Managerial | 7 | 7 | 4 | 6 | 8 | 7 | 8 | 5 | 52 |
| TOTALS | 178 | 165 | 162 | 133 | 170 | 179 | 183 | 152 | |

Human use (behavioral sciences) is the area where the greatest deficiencies occur. Present recreational use is handled best while concerns for medical help and public welfare fare badly. Only one project, Brannon Island and Franks Tract, had a required location for an emergency helicopter pad. Community involvement in parks is of major concern in both Peru and the United States as is communications (Figure 8). Aesthetics is an area of growing concern in both countries but visual resource management was an inventory consideration of emphasis of all sixteen areas, primarily because of planning team expertise. Visual resources were the primary management objective of the Rainbow Valley Study in the United States and the Nazca Lines Study in Peru (Figure 9).

The environmental design professions are well represented in the planning process for both Peru and the United States. Peru where the landscape architecture profession is almost non-existent, is most lacking in landscape planning. Architects tend to dominate land planning in Peru while planners predominate in the United States. Historic preservation is a growing concern in both countries but the historic resources of Peru far outstrip the ability of a small country to cope (Shippee 1932 and Morris 1976).

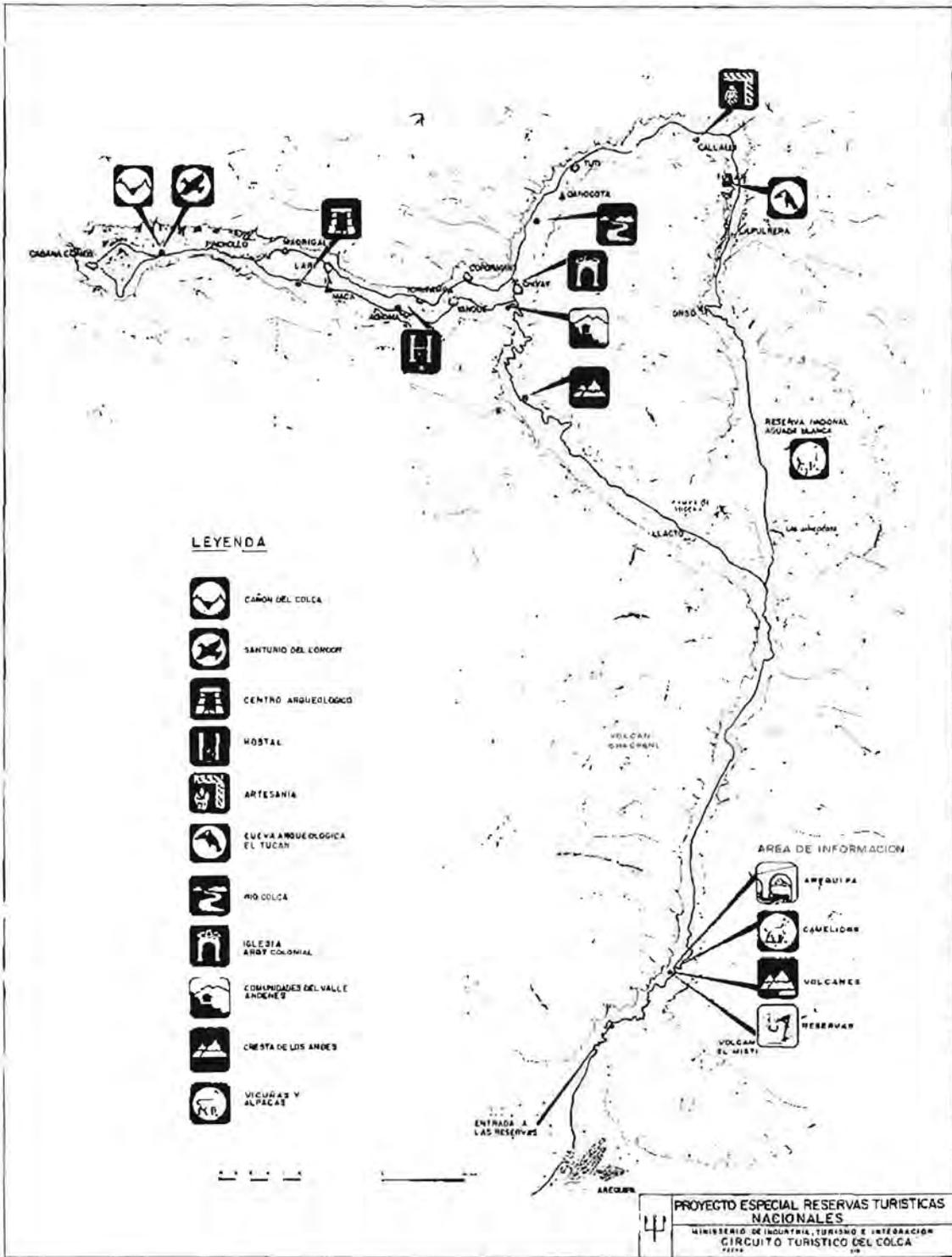
Implementation strategies are closely tied to governmental action and the morals of local society. Economically, the simple fact is that the United States has spent more on conservation planning than has Peru. Peru is still sorting out the governmental instability of the past so legal determinants supporting management are not as well formed and in place as in the United States. Land tenure, for instance, is complicated in Peru in that land is seldom set aside strictly for one use. Economic pressures often compromise conservation goals even in areas where tourism is heavily dependent on conservation stewardship. Indigenous populations often occupy conservation lands with a high level of exploitive technology. Although inholdings frequently occur in the United States conservation lands, property rights often limit their impact. Property rights were compromised in Peru following the 1968 military takeover. Politically, not one of the sixteen study areas is

without some form of resource extraction. Ten areas have grazing, twelve have hunting, nine have timber harvesting, and six have mining.

Administrations that oversee facilities, continuing public participation, reclamation projects, implementation of rules and regulations, and continual funding are very active although far from truly effective in the United States. In Peru, administration is centralized in Lima and field supervision is very poor with the exception of Machu Picchu and Quistococha. The worst administered areas in the United States are those without on-site supervision. Peruvian Management problems are most evident in these same areas of poor field supervision. One vital planning element which offsets this condition in the United States is that the resource data information on planning study areas is collected in a consistent manner which allow derivative maps to be produced. These derivative maps aid field personnel by relating resources to management functions (Figure 10).

CONCLUSIONS

The conservative planning process in the United States is better developed on the surface than Peru's. This is probably because the United States has been at it longer, probably because of the funding level for conservation, and probably because of the expanded nature of the planning profession in the United States. The irony, however, is that Peru still contains more opportunities for conservation and planning projects. With a growing recognition of the value of tourism and the uniqueness of the Peruvian landscape, with a growing professional presence in the long range planning, and with an increasing commitment to resource monitoring and inventory, comparisons in the future will be much more similar.

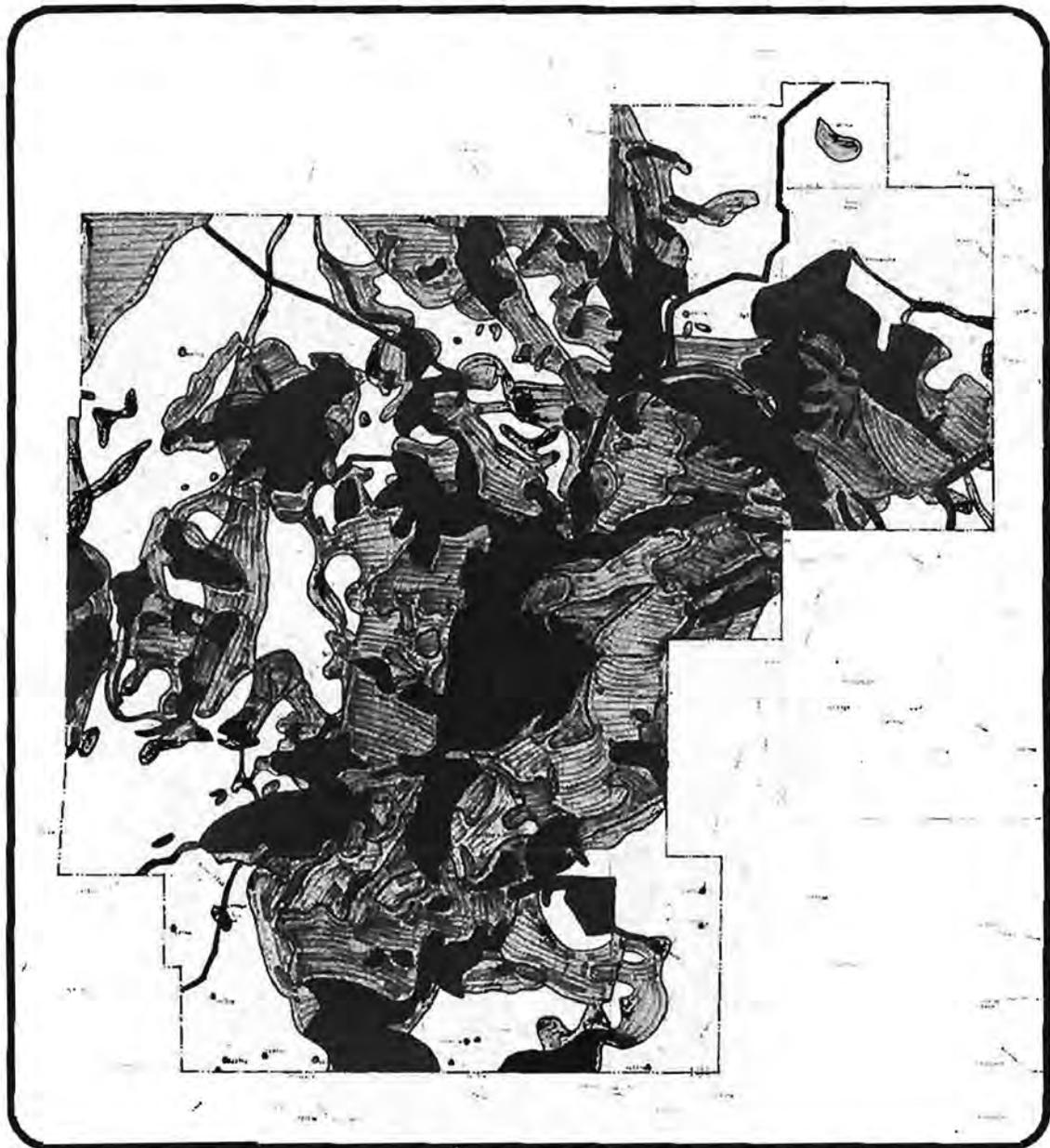


LEYENDA

- CAÑON DEL COLCA
- SANTUARIO DEL LLORCOY
- CENTRO ARQUEOLÓGICO
- HOSTAL
- ARTESANÍA
- QUEVA ARQUEOLÓGICA EL TUCÁN
- RÍO COLCA
- IGLESIA ANDÍ COLONIAL
- COMPAÑÍAS DEL VALLE ANDEÑOS
- CRESTA DE LOS ANDES
- VICUÑAS Y ALPACAS

PROYECTO ESPECIAL RESERVAS TURISTICAS NACIONALES
 MINISTERIO DE INDUSTRIA, TURISMO E INTEGRACION
 CIRCUITO TURISTICO DEL COLCA
 1974





Pine Forest Range
 Interim Recreation Management Plan
 U.S. Bureau of Land Management
 Winnemucca, Nevada District Office

LANDSCAPE ARCHITECTURE PROGRAM
 DEPARTMENT OF ENVIRONMENTAL DESIGN
 UNIVERSITY OF CALIFORNIA, RIVERSIDE

0 1 2 3 4 5 Miles

N

ORV Accessibility

| | |
|-------------------------------------------------------------------------------------|--------------------------|
|  | ACCESSIBLE |
|  | GENERALLY ACCESSIBLE |
|  | IMPAIRED ACCESS |
|  | SEVERELY IMPAIRED ACCESS |
|  | INACCESSIBLE |

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WILDERNESS VERSUS MORE INTENSIVE RECREATION DEVELOPMENT PERCEPTIONS OF THE CEDERBERG CONTROVERSY*

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INTRODUCTION

Over the years planners in many countries have faced the dilemma of retaining land in a wilderness condition, or of encouraging more intensive recreation development (Lloyd & Frissell, 1970). This dilemma was the crux of a controversial development proposal for the Cederberg mountains in southern Africa, in 1984. To highlight several important issues that should be addressed in resolving the "Cederberg Controversy", attention is drawn to past land-use patterns in the Cederberg and perceptions of appropriate recreation use for the area.

A BACKGROUND TO THE CEDERBERG CONTROVERSY

Features of the Cederberg

The Cederberg (so named after forests of cedar trees that were found in the area) is part of a chain of folded mountains that run parallel to the south western coastline of southern Africa (see Figure 1). The nearest major urban centre is Cape Town 25 km away, which has a population of 1.8 million that is expected to double by the year 2010.

The Cederberg mountains cover an area of approximately 130,000 hectares and rise above the surrounding coastal plains to heights of more than 2000 m. The area experiences dry, hot summers but in winter temperatures may drop below freezing and snow often falls on high ground. The vegetation of the area is classified

as mountain fynbos (also referred to as a type of macchia or chaparral) (Acocks, 1975). A number of endemic plant species and various rare and endangered plant, fish, bird and mammal species occur in the area.

Past land-use in the Cederberg

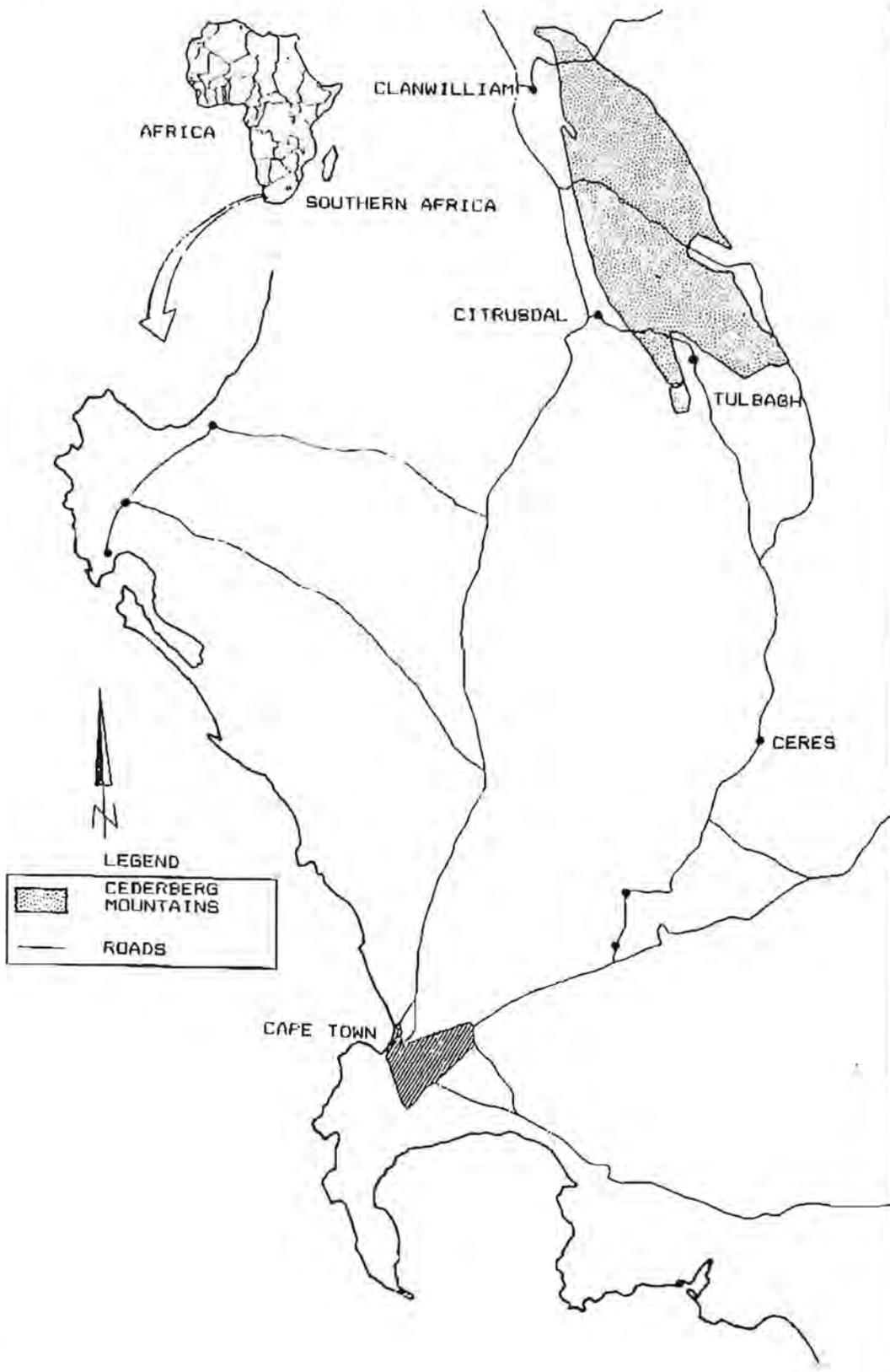
Bushmen (Xoi) and Hottentot (San) people were early hunter-gatherer inhabitants of the Cederberg area. Until the early 1700's only a few white explorers had ventured into the mountains. However, from that time intense exploitation of a number of natural resources began. It was not until the turn of this century that management controls were effectively enforced.

From the 1920's, improved access and more widespread knowledge of the area led increasing numbers of visitors to the Cederberg. In popular places the impact of excessive visitor use was apparent by the mid 1930's. Visitor numbers continued to increase after the Second World War.

In the late 1960's several campsites were established in the area to cater for the growing demand. Cabins were also built for public use. These facilities concentrated visitor use in a few places that had already been modified by previous non-recreation land-use practices (Andrag, 1977). However, much of the wilderness character of the Cederberg was retained.

In 1973 the South African Department of Forestry (DOF) declared approximately 70,000 hectares of state-owned land in the Cederberg a wilderness area. The purpose was to preserve the area as far as possible in a

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condition undisturbed by modern man, providing the opportunity for visitors to experience solitude and the primeval forces of nature (Bands, undated). Most of the remaining land in the Cederberg is privately owned. Extensive agriculture, mainly stock grazing, is practiced, but the area has limited agricultural potential. The area as a whole is a very important water catchment, and since 1976 an effort has been made by the DOF to ensure that activities are compatible with the management objectives of maintaining good quality water run-off, nature conservation and providing extensive outdoor recreation opportunities. However, in practice it has been difficult to ensure that all activities are compatible with these management objectives. This difficulty may result from the DOF's inability to effectively integrate diverse activities which have distinct yet interrelated impacts, without imposing excessive restrictions on private land-owners. As a result there has been an impasse in the implementation of a coordinated recreation policy for the area as a whole.

In an effort to prevent excessive recreation use, restrictions on visitor numbers and activities were introduced in the wilderness area. However, many people have entered the area illegally and several places and routes have become degraded (Bands, undated). Some visitors have complained that they have met too many other parties in the area (Andrag, 1977). Similar problems have occurred on private land.

There has thus been an insidious transformation of recreation opportunities in the Cederberg over the years. To some visitors conditions have now become inconsistent with their previous experiences and current expectations, and they no longer visit the Cederberg (McCrea, 1983). Others are however happy with the recreation opportunities in the area, and the popularity of the campsites and cabins continues to increase. In effect, the transformation of recreation opportunities has resulted in a barely perceptible process of visitor displacement and succession.

This pattern of events raises the question of what constitutes appropriate recreation use of the Cederberg: Particular attention was drawn

to this question by the "Cederberg Controversy" in 1984.

The "Cederberg Controversy"

The controversy arose following a proposal by the National Parks Board (NPB) to declare the Cederberg and adjacent state land a national park, and to increase the intensity of development in the area. The proposal included the establishment of four tourist complexes, each accommodating up to 250 people, to be centered in nearby towns (See Figure 1). In addition, sixteen base camps with rustic huts for hikers were planned for popular hiking routes in the mountains. By comparison with the previous incremental transformation of recreation opportunities in the Cederberg, this proposal would constitute a substantial change in the status quo.

The proposal gave rise to a public outcry, despite assurances from the NPB that the development would protect the inherent ecological values of the area whilst at the same time developing the outdoor recreation potential of the Cederberg. In order to resolve the issue an investigating committee was appointed to advise the then Minister of Environment Affairs and Tourism. DOF and NPB officials addressed the committee on camera, site-investigations were undertaken, memoranda were invited from interested parties, interviews conducted and public hearings held. The investigation drew the attention of a spectrum of interest groups, highlighting the integral relationship between recreation and other land-use activities.

Those in favour of the NPB proposal, including representatives of local authorities, commerce and agriculture, had a two-fold argument. Firstly, they argued that the Cederberg provided an appropriate setting of national significance that could cater for the continuously increasing demand for outdoor recreation. Secondly, they were of the opinion that the development of additional recreation facilities would stimulate the economy of the region, through the creation of employment opportunities and increase in tourism. It was felt that provided the development was

controlled, the wilderness character of the Cederberg would not be adversely affected.

Those opposed to the proposal, including private landowners in the area, outdoor clubs, professional environmental scientists and conservation bodies, were of the opinion that the wilderness character of the area could be destroyed by further development and the associated increase in visitor use. It was suggested that the existing undeveloped area should be left in as natural a condition as possible. This would retain a suitable recreation setting for those who wished to forego the comforts and conveniences of campsite, cabins and related facilities already provided in the Cederberg.

The final report of the investigation committee recommended that future use of the Cederberg should only be considered and resolved in terms of a national policy on nature conservation management and jurisdiction. However, no specific recommendations were made about resolving the question of appropriate recreation use for the area.

While it is agreed that there is a general need for such a national policy, it should be recognized that the proposed policy *per se* will not resolve the "Cederberg Controversy". This follows because the issue of nature conservation management and jurisdiction is secondary to the question of appropriate recreation use. Given the general agreement that the Cederberg should be conserved, the question that remains to be addressed concerns the determination of acceptable levels and patterns of recreation use in the area. More specifically, the central issue of the "Cederberg Controversy" concerns the divergent and conflicting perceptions of wilderness versus more intensive recreation development, and hence the question of appropriate recreation use for the area. Thus, only once attention has been given to this specific question (in the context of an integrated land-use planning framework for the area as a whole) should the issue of conservation management and jurisdiction be addressed.

WILDERNESS VERSUS MORE INTENSIVE RECREATION DEVELOPMENT

A Survey of Visitor Perceptions

A survey was undertaken to determine visitor perceptions of the appropriate recreation use for the currently undeveloped area of the Cederberg. The results highlighted several important issues that should be addressed by planners in determining future use of the area.

Questionnaires were mailed to a random sample comprising 284 visitors to the Cederberg during 1984/1985. The sample included a representative proportion of wilderness, campsite and cabin visitors. A 65% response rate was attained.

The survey focused on three considerations: recreation settings, activities and experiences. The differentiation of these considerations has been found to be useful in planning recreation, and in assessing preferences for specific types of recreation opportunities (Driver & Brown, 1978).

Recreation Setting

A recreation setting can be described as the combination of physical, biological, social and managerial attributes that give value to a place (Clark & Stankey, 1979). By varying the combination of these attributes, management can provide different recreation opportunities. Visitor perceptions of the appropriate recreation setting for the currently undeveloped area of the Cederberg, and the relative importance of setting attributes were determined by an application of conjoint analysis to the visitor responses collected in the survey.

The aim of conjoint analysis is to study how people make choices between multi-attribute objects. The word "conjoint" is derived from the evaluation of the relative values of attributes considered jointly, which might not be individually measurable (Johnson, 1974). The technique is based on the assessment of a prespecified combination of different levels of the attributes that describe a set of objects

(recreation settings in this case) (Green & Srinivasan, 1978). Conjoint analysis facilitates the measurement and prediction of the utility of each attribute that partially defines a respondent's preference for a particular object (Green & Wind, 1975; Pekelman & Sen, 1979). Hence it is possible to measure the trade-offs that respondents make between attributes which describe a particular object. In addition, the utility of different objects can be determined.

Conjoint analysis has been used to study preferences and perceptions of a variety of multi-attribute objects, from durable commodities to wilderness trails (Cattin & Wittnik, 1982; Cospes & Kinsley, 1984; Raimondo, 1985). Conjoint analysis has however not previously been applied in the context of recreation settings. This application should therefore be viewed as exploratory, particularly since no work has been done to date to establish what particular attributes distinguish recreation setting in southern Africa.

By drawing from experiences gained in the United States (Clark & Stankey, 1979) and by consulting local recreation planners and researchers, the attributes outlined in Table 1 were found to be most pertinent in distinguishing hypothetical primitive, semi-primitive and semi-developed settings for the Cederberg.

In an application of conjoint analysis, consideration must be given to minimizing the total number of attribute combinations to be ranked. Respondents might otherwise be overloaded with information and thus provide arbitrary and meaningless trade-offs (Green & Wind, 1975). Such overloading limits the total number of attributes and levels that can be meaningfully considered by respondents. Following Blake's (1982) suggestion that it is possible to interpolate the value of an attribute level not presented to respondents (provided that it lies between two other specified levels), the attributes of interparty contact and access were presented to respondents at only the primitive and semi-developed levels. This later proved to be somewhat unsatisfactory.

The prescribed combination of attribute levels were presented to respondents for ranking in a scenario format (See Table 2).

The relative importance of attributes for all respondents was: - freedom in selecting a route (31%); interparty contact (25%); access (22%); and visitor facilities (22%). This ranking confirmed the writer's a priori expectation that freedom in route selection (a surrogate for the degree of management control) was more important than the other attributes in describing the visitors' perceptions of the appropriate recreation setting for the Cederberg. Slight differences in the relative importance of attributes were found between hikers, campers and cabin visitors (See Table 3).

For the combined set of all respondents, the ideally appropriate setting was characterized by access to the area on foot, the opportunity for visitors to select their own route, rare and unexpected contact with other parties, and the provision of overnight shelters. Given that this combination of attributes describes the setting perceived to be ideal (rated as 100%) it can be inferred that the primitive setting achieves a 78% rating against the ideally appropriate setting, whereas the semi-developed setting achieves only an 11% rating against the ideal. As expected, the primitive setting was perceived to be ideal by the hikers. However, there was more similarity than anticipated between campers' and cabin visitors' perceptions of the appropriateness of the primitive and semi-developed settings.

The rating value of the semi-primitive setting could not however be predicted with confidence, despite Blake's (1982) suggestion, because there was no acceptable method of interpolating inter-party contact and access at this level. The suggestion, presupposes a linear rating scale between the settings, but no such relationship was apparent in the data. However, it is apparent that there are differences between hikers, campers and cabin

Table 1. Attributes that distinguish hypothetical recreation settings for the Cederberg

| <u>SETTINGS/ ATTRIBUTES</u> | <u>PRIMITIVE</u> | <u>SEMI- PRIMITIVE</u> | <u>SEMI- DEVELOPED</u> |
|---------------------------------|-----------------------------------|--------------------------------------|-----------------------------------------|
| INTERPARTY CONTACT | unexpected & rare | anticipated & occasional | expected & frequent |
| ACCESS | no paths constructed, unmotorised | high-standard paths, unmotorised | gravel roads, motorised and unmotorised |
| FREEDOM IN ROUTE SELECTION | plan own route | select from several permitted routes | instructed to follow specific route |
| VISITOR FACILITIES | none | overnight shelters | well-equipped chalets |

ACCESS INTO AREA: On foot

ACCESS INTO AREA: A few gravel roads allowing vehicles

SELECTING A ROUTE; Visitors plan own routes select one of permitted routes

SELECTING A ROUTE: Visitors may

CONTACT WITH OTHER PARTIES: Rare and unexpected

CONTACT WITH OTHER PARTIES: Rare and unexpected

VISITOR FACILITIES: No facilities

VISITOR FACILITIES: Well-equipped chalets

Figure 2. An example of scenarios ranked by respondents.

Table 2. The percentage importance of attributes in defining appropriate recreation settings for the Cederberg, according to visitor groups.

| RESPONDENTS | HIKERS | | | CAMPERS | | | CABIN VISITORS | | | ALL RESPONDENTS | | |
|--------------------|--------|----|----|---------|----|----|----------------|----|----|-----------------|----|----|
| | P | SP | SD | P | SP | SD | P | SP | SD | P | SP | SD |
| ATTRIBUTES: | | | | | | | | | | | | |
| INTERPARTY CONTACT | 24 | | 0 | 27 | | 0 | 27 | | 0 | 25 | | 0 |
| ACCESS | 26 | | 0 | 17 | | 0 | 22 | | 0 | 22 | | 0 |
| FREEDOM IN ROUTE | | | | | | | | | | | | |
| SELECTION | 29 | 13 | 0 | 32 | 29 | 0 | 25 | 26 | 0 | 31 | 24 | 0 |
| VISITOR FACILITIES | 21 | 15 | 0 | 0 | 24 | 11 | 0 | 25 | 11 | 0 | 22 | 11 |
| | 100 | | 0 | 76 | | 11 | 74 | | 11 | 78 | | 11 |

KEY: P = PRIMITIVE
 SP = SEMI-PRIMITIVE
 SD = SEMI-DEVELOPED

visitors regarding the appropriateness of the primitive and semi-developed settings, and the appropriateness of the attributes measured at the semi-primitive setting. There are also differences in these groups' perceptions of appropriate activities and important experiences, as discussed below. Therefore, it may be reasonable to suggest a range of values for the attributes, despite the absence of any formal rating at the semi-primitive level. These values are presented in the discussion to give coherent impression of the ratings, rather than to provide a statistical prediction.

The experience of solitude was very important to hikers. In addition, activities associated with a degree of upgraded access

and occasional contact with other users, e.g. outdoor games or scenic drives, were not perceived to be appropriate for the area. Therefore, for hikers it might be reasonable to assume that inter-party contact and access at the semi-primitive level would each have a rating in

the range of 10-15%. On these grounds it is likely that the semi-primitive setting achieves a 50-60% rating against the ideally appropriate setting for hikers.

The opportunity to experience solitude was also very important to campers and cabin visitors. However, by comparison with the hikers, these groups perceived activities such as outdoor games and scenic drives to be more appropriate for the area. For these groups the approximate value of inter-party contact and access at the semi-primitive level might therefore each be rated in the range of 10-30%. On this basis the semi-primitive setting would be expected to achieve a rating of at least 70%, but probably more, of the ideally appropriate setting for campers and cabin visitors.

Recreation Activities

Respondents were asked to imagine that they were planning the future of the currently

undeveloped area of the Cederberg, and to indicate how appropriate a number of activities were for the area. Activities were selected in a series of pre-survey tests. A four-point rating scale was used to distinguish whether activities were perceived to be inappropriate, fairly inappropriate, fairly appropriate or appropriate. The pre-survey tests indicated that there was no need to provide a neutral category. Moreover, respondents claimed that the absence of a neutral category forced them to clarify their perceptions regarding the appropriateness of each activity.

Currently the following activities may be undertaken in the area: backpacking (visitors decide on route, and where to sleep overnight), rock climbing, photography, bird-watching, swimming in rivers and other similar activities (Bands, undated). If the activities perceived to be fairly appropriate or appropriate by the majority of visitors were to be allowed in the area in the future, the following would be included: day walks (95%); rock climbing (95%); backpacking (95%); nature study (94%); swimming in rivers (90%); National Hiking Way Trails (NHWT) (shelters are provided along a marked hiking route) (69%); picnicking (55%); and fishing (51%). Of these only NHWT and picnicking are likely to conflict with existing management policy. Neither activity is necessarily destructive. However, both are associated with a more restricted choice of destination, more frequent visitor contact, more modified access, and more extensive visitor facilities than provided by current management policy.

There are however significant differences between hikers, campers and cabin visitors regarding the appropriateness of several activities (See Figure 3). *A priori* differences were expected between the groups' perceptions because of variations observed in the activity patterns of these groups in the field, and the differences that have been reported from research done elsewhere in southern Africa (Pickles, 1978). It was anticipated that the perceived appropriateness of activities associated with more developed settings than currently exist in the Cederberg, would increase from hikers to campers to cabin visitors. Significantly different results were therefore

expected between these groups and more particularly between hikers and cabin visitors, regarding the appropriateness of NHWT, picnicking, caravanning and camping, commercial trailing, scenic drives, outdoor games, night entertainment, indoor games and motorbike trails.

In examining the null hypothesis that no such differences existed between visitor groups, chi-square tests were performed for all possible combinations of activity rating frequencies (See Table 4).

Clearly it is possible that some of the chi-square values attain significance due to chance effects alone, but certainly not all. Conservatively speaking, in forming 153 independent chi-square tests one might have expected 7 of the significant results (at the 5% level) to be attributable to chance. The occurrence of 13 or more significant results in 153 such tests has a probability close to the 5% level. Given that 19 significant results were actually obtained, there is incontrovertible statistical evidence against the null hypothesis of no marked differences between visitor groups on any test. This approach is designed to compensate more than adequately for applying the same level of significance in repeated analyses of the data, though in practice the analyses are not independent. The reader's attention is therefore conservatively but confidently drawn to the largest chi-square statistics, as given evidence of some visitor group differences.

Other than the unexpected differences between campers and cabin visitors over the perceived appropriateness of caravanning and camping, and possibly nature study, there was no evidence of significant differences between these two groups. This was contrary to *a priori* expectations. There was however substantial evidence of differences in perceptions between hikers and campers, and hikers and cabin visitors. The former groups differed sharply in their perceptions of the appropriateness of caravanning and camping. Surprisingly, there was no evidence of differences between the latter groups in this regard. This might be

FIGURE 3: THE % FREQUENCY ACTIVITIES WERE RATED "FAIRLY APPROPRIATE" AND "APPROPRIATE" BY VISITOR GROUPS.

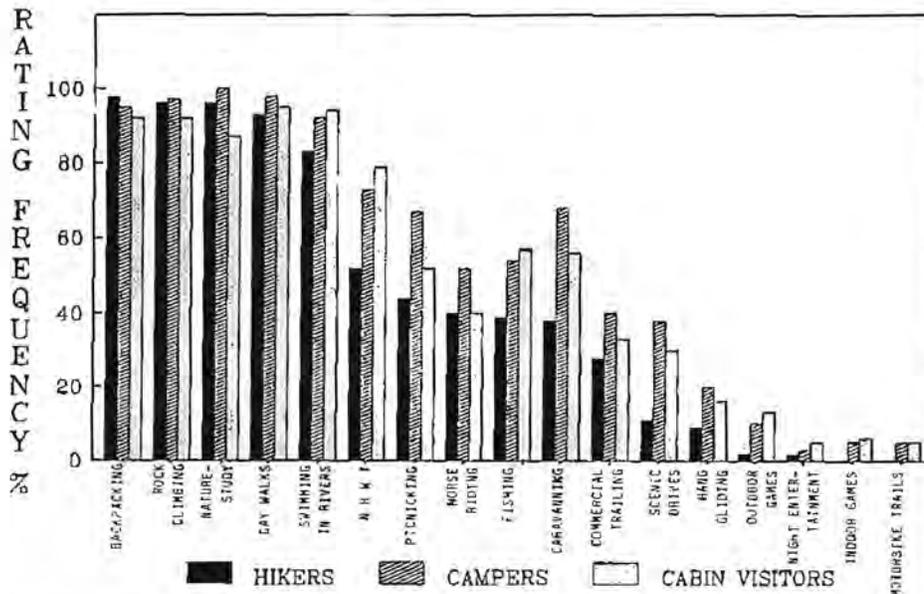


Table 3: Significant Chi-square values obtained for differences between visitor groups' activity rating frequencies.

| ACTIVITIES | Hikers vs. Campers | | | Hikers vs. Cabin Visitors | | | Campers vs. Cabin Visitors | | |
|---------------------|--------------------|--------|--------|---------------------------|--------|-------|----------------------------|-------|--------|
| | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| Backpacking | | | | | | | | | |
| Rock Climbing | | | | | | | | | |
| Nature Study | | | | | | 3.848 | | | 4.673 |
| Day Walks | | | | | | | | | |
| Swimming in Rivers | | | | | | | | | |
| NHWT | | 5.636 | | | 11.774 | 4.455 | | | |
| Picnicking | | 5.698 | | | | | | | |
| Horse Riding | 4.283 | | | | | | | | |
| Fishing | | | | | 3.918 | | | | |
| Caravanning | | 10.606 | 13.095 | | | | | 4.011 | 13.949 |
| Commercial Trailing | | | | | | | | | |
| Scenic Drives | 8.209 | 10.764 | | 5.256 | 6.042 | | | | |
| Hang Gliding | | | | | | | | | |
| Outdoor Games | 5.026 | | | | 8.186 | | | | |
| Night Entertainment | | | | | | | | | |
| Indoor Games | | | | | | | | | |
| Motorbike trails | 5.999 | | | | | | | | |

Key: 1. Inappropriate vs. fairly inappropriate, fairly appropriate and appropriate
 2. Inappropriate and fairly inappropriate vs. fairly appropriate and appropriate
 3. Inappropriate, fairly inappropriate and fairly appropriate vs. appropriate

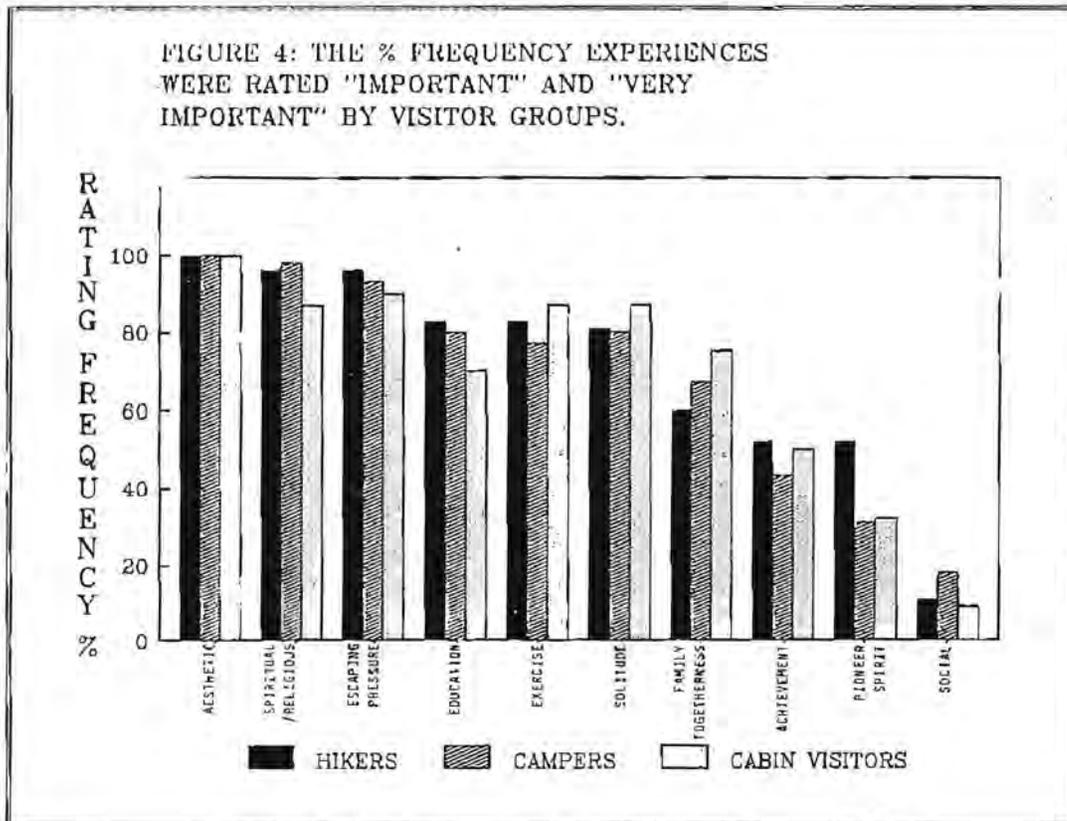
explained by the vested interest of campers in caravanning and camping. There were also significant differences in the perceptions of hikers and the other groups regarding the appropriateness of NHWT, scenic drives and outdoor games. These activities are usually associated with settings characterized by access via constructed paths or gravel roads, a limited choice with other parties, and the provision of some visitor facilities. The differences between hikers and the other groups regarding the appropriateness of these activities therefore corroborates the evidence of differences between these groups obtained by conjoint analysis, as discussed above. Contrary to expectations, the differences between these groups was essentially limited to activities associated with a semi-primitive or semi-developed setting. It was expected that activities such as backpacking and rock climbing, usually associated with a primitive setting, would be perceived by all visitor groups to be appropriate for the area. This view was vindicated. However, the consensus between all groups regarding the inappropriateness of activities such as indoor games and night entertainment, usually

associated with more developed settings, was unexpected.

Recreation Experiences

Respondents were asked to indicate the importance of various experiences in their visit to the Cederberg on a scale of not at all important, not very important, important or very important.

It emerged that the opportunity to be alone with the primeval forces of nature was important or very important to most respondents (See Figure 4). However, the extent to which most visitors are likely to realize such experiences may vary. This is because there are differences in the extent of modification, visitor use and management control in different areas of the Cederberg. *A priori* differences were therefore expected between the three visitor groups regarding the importance of spiritual or religious experiences; solitude; exercise; opportunities to gain a sense of achievement; facing challenge, risk and uncertainty; and meeting other people.



The chi-square test was used to examine the null hypothesis that no such differences existed. From a conservative point of view, one might have expected 4 significant results (at the 5% level) to have been obtained by chance effects alone for 90 such tests. Because only 3 significant results were obtained, there is not sufficient statistical evidence to confidently reject the null hypothesis. Nonetheless, there may be evidence that more hikers than campers ($X^2=5.019$) and cabin visitors ($X^2=4.798$) perceived the opportunity to face challenge, risk and uncertainty to be important or very important. There may also be evidence that more hikers than cabin visitors ($X^2=4.320$) perceive spiritual and/or religious experiences to be very important in their visit to the Cederberg.

A possible reason for the weak evidence against the null hypothesis, despite the apparent differences in experience opportunities in the Cederberg, can be suggested. There may be real differences in the extent to which the visitor groups realize some experiences (via the levels of solitude experienced by hikers compared to cabin visitors). However, each group may have a different understanding of the import of the experience in question because this understanding is relative to their other experiences. Thus in order to assess differences in the relative importance of experiential considerations to visitor groups, it is necessary to specify more precisely what is implied by each consideration and to ascertain that they are in fact comparable.

IMPLICATIONS FOR PLANNING THE FUTURE RECREATION USE OF THE CEDERBERG

As the population of the southwestern Cape expands, demands for recreation opportunities in the Cederberg are likely to increase dramatically. The wilderness versus more intensive recreation development dilemma that already faces planners in resolving the future use of the area, is therefore likely to be exacerbated. Unless this dilemma is specifically addressed, the continued transformation of recreation opportunities and the associated process of visitor displacement and succession is likely to be accelerated. The result may be increasing

conflict between visitor groups and between recreation and other land-use activities.

Proponents of the NPB plan to increase the intensity of recreation development in the Cederberg assert that the plan provides a means of accommodating the increasing demand for recreation, without adversely affecting the wilderness character and non-recreation resource values of the area. This assertion would be supported by the majority of visitors to the Cederberg, given their perceptions of the appropriate setting and activities for the currently undeveloped area and given the important experiences in their visit. Moreover, since visitors to the Cederberg represent only a small proportion of society (Andrag, 1977), and are likely to be more conservation-oriented than the public at large, it is reasonable to assume that there would be widespread support for the NPB proposal. It could therefore be suggested that despite opposition to the proposal, a limited degree of more intensive recreation development in the Cederberg should be encouraged.

However, merely increasing the intensity of recreation development to accommodate increasing demand, is not likely to provide a lasting solution (Jubeville & Becker, 1983). The development of more intensive recreation opportunities in the Cederberg is likely to attract visitors who demand further development. Such compounding of demand and the resulting incremental development is already apparent elsewhere in southern Africa. In the long term, incremental development is likely to result in increasing homogeneity of recreation opportunities, and may lead to the acceptance of lowest common denominator recreation conditions (Dustin & McAvoy, 1982). Such conditions are also likely to impinge on other resource values.

In the culturally diverse society of southern Africa, there is particular value in maintaining a diversity of environmental conditions, and of providing a spectrum of recreation opportunities from wilderness to the city setting. By concentrating further development in the Cederberg area, irreversible impacts may be imposed on non-recreation resource values that could be important to society in the future. In addition, the above-mentioned survey reveals

that there are divergent perceptions of appropriate recreation use for the area. Hikers, in particular, recommend that the Cederberg should be left in a wilderness condition. There is a need to respect the preferences of minority groups, provided that this does not detract unreasonably from the well-being of the majority. This is of particular relevance in resolving the "Cederberg Controversy" because hikers are dependant on the rapidly diminishing and irreplaceable resource of wilderness.

In conclusion, if recreation is to be an integral part of an efficient, equitable and sustainable land-use planning and management framework, there is a need to consider each recreation opportunity as one element of a spectrum of recreation opportunities. Moreover, recreation opportunities need to be considered in relation to other potential land-use opportunities. The dilemma of wilderness versus more intensive recreation development should therefore not be seen as an either-or-question. Attention thus needs to be given to determining appropriate recreation use of the Cederberg in the context of an integrated land-use planning framework for the southwestern Cape region as a whole.

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THE CAIRNGORMS, SCOTLAND ESTABLISHMENT OF A WORLD HERITAGE SITE*

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INTRODUCTION

The British Government has not nominated any mainland Scottish natural site for inclusion in the World Heritage List. This paper argues the case for World Heritage status for the Cairngorms by questioning the rationale for their omission.

Since the 3rd World Wilderness Congress, the British Government ratified the World Heritage Convention on the 6th December 1985, and an environmental spokesman confirmed that the Government strongly supports World Heritage and will actively participate.

The Department of the Environment issued a press release on the 21st November 1985, which announced the U.K. nominations for inclusion in the World Heritage List and stated that the Government was anxious to conserve both our natural and cultural heritage and they should both be fully and properly represented.

When the various attempts to conserve Scotland's natural environment are reviewed, it is evident that a policy for Scotland is needed. To this end, the continuing support of the World Wilderness Congress is sought and it is proposed that the 4th World Wilderness Congress reaffirms the resolution passed at the plenary session on the 14th October 1983. (See appendix i.)

ATTEMPTS TO CONSERVE SCOTLAND'S NATURAL HERITAGE 1880-1980

*in Krump, E.E., & P.D. Weingart, eds. 1992. *Management of Park & Wilderness Reserves*. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

Just over a century ago, in 1884, James Bryce unsuccessfully promoted a bill to permit the right of access to the mountains. He had recently returned from Washington, where he had been British Ambassador at the time Yellowstone National Park was established in 1872. During the following 60 years, which included the two world wars, Britain's higher priorities did not include her natural heritage.

The immediate post war British Government promised "A better standard of living for all," which led to a general increase in leisure time. In 1945, the Ramsay Report predicted this trend and recommended the creation of five national parks in Scotland, including the Cairngorm area. The Scottish National Parks Committee and the Scottish Wildlife and Conservation Committee endorsed the Ramsay recommendations in 1947, and extended the Park concept into the sphere of wildlife conservation.

In 1948, the Secretary of State for Scotland identified the five original Ramsay sites as National Park Direction Areas. The establishing legislation required local authorities to submit all planning applications to the Secretary for scrutiny within these designated areas. The National Park and Access to the Countryside Act 1949 introduced a Park system in England and Wales but not Scotland. Many environmentalists hold the view that the following reasons directed Government not to award National Park status to Scottish sites:

1. articulate opposition to any proposal that it was feared might lead to greater public ownership

2. comparison of easy and apparently free access to the hills in Scotland, compared with England/Wales

3. past experience of depopulation and concern for rural employment

4. the possible loss of regional/local authority responsibility for development control (not always the case, the four affected Local Authorities were in agreement to set up Loch Lomond National Park, only the Secretary of State (SOS) remained unconvinced)

Part III of the 1949 Countryside Act which covers nature conservation has been widely applied in Scotland; over 40 National Nature Reserves have been declared under the protection of the Nature Conservancy Council (NCC) which is also responsible for notifying Sites of Special Scientific Interest (SSSIs).

In 1949, local authorities designated "Areas of Great Landscape Value" where a measure of control exists, but a common standard across Scotland remains elusive.

In 1954, the Nature Conservancy Council established the Cairngorm National Nature Reserve (NNR) with the aim of integrating opportunities for recreation which were compatible with nature conservation and which permitted the process of environmental evolution.

Nearly two decades later, under Section 9 of the Countryside (Scotland) Act 1967, the Secretary of State designated Areas of Special Planning Control where local planning authorities are required to consult the Countryside Commission for Scotland (CCS) on selected forms of development.

In 1974, Dr. Kai Curry-Lindahl presented a paper in which he compared designations for natural environments in different countries. His report included a survey of the Cairngorms for the IUCN in which he described the area as "Britain's foremost natural site," and was unable to understand why no statutory protection existed. Unfortunately, his findings did not find

favour with the authorities; his report "gathered dust." He returned in 1981, and identified areas of significant deterioration since his previous visit.

1980-PRESENT

In 1980, National Scenic Areas (NSA) replaced National Park Direction Areas and introduced (1) a notification process for certain planning applications, (2) conservative measures to land management. However, agriculture and forestry remain outside the formal planning process; the NSA concept relies entirely on development control to conserve natural beauty. It has no significance either for nature conservation or for recreation. The Nature Conservancy Council (NCC) has no formal status in the system. National Scenic Area legislation enables central government to intervene by enforcing a "calling in" 28-day period to operate:

1. if the Countryside Commission objects to the intention of a planning application
2. for all buildings over 12m high,
3. for vehicle tracks except Forestry Commission access,
4. for any new highway project estimated to cost more than £100,000.

The World Conservation Strategy (1980) prepared by the IUCN recognized the importance of the Scottish Highlands and recommended that priority to secure protection of both mountain and highland systems should be established.

The IUCN General Assembly, which met in New Zealand 1981, passed a resolution calling on the British Government to "take all practical steps to secure for the Cairngorm mountains protection appropriate to their international significance."

In 1982, the IUCN issued an indicative inventory of natural sites of World Heritage Quality. Only two sites in Britain were recognized, St. Kilda and the Cairngorms. Also

in 1982, a study entitled "The Future of the Cairngorms" (Watson et al. 1982) was published with the support of a wide range of British Conservation Organizations. This contained a detailed account of the pressures being faced by the area and made recommendations for action by Central and Local Government.

The British Government announced the designation of St. Kilda as a World Heritage Site in 1986. In July, 1987, however, the Scottish Office (The Government Department responsible for World Heritage designation in Scotland) confirmed that it had taken no action to establish a World Heritage Site in the Cairngorms.

The Cairngorms are included in the U.K. list of Upland Heather which was submitted to the Council of Europe Environmental Action Programme.

The Cairngorm Lochs are listed in the RAMSAR Convention on wetlands of International importance.

12th February 1986—a representative from the Countryside Commission (CC) informed the U.K. Committee for IUCN that "mixed" sites (i.e., sites that contain both natural and cultural heritage) were being proposed by the U.K. for world heritage status and that the Lake District National Park in England was being submitted as a test case.

15th May 1987—the Chairman of the Countryside Commission for Scotland (CCS) announced that his Commission would re-open the 40-year-old proposal to create National Parks in Scotland, and said priority would be given to the Cairngorms. He drew attention to an area of 3975km² of the Cairngorms which was identified by The Scottish Office, as an area of special environmental significance.

The many different methods of statutory protection have done little to impede the forces of ecological degradation which threaten the Cairngorms. By International standards the mountains, forests and wetlands are poorly protected.

At the next General Assembly of the IUCN, British NGOs are likely to re-state the continuing problems within the Cairngorms and call for further support to obtain World Heritage designation.

RELEVANT DISCUSSION AND COMMENT

The U.K. is unique in the manner she conserves her natural heritage through two agencies:

1. The Nature Conservancy Council, NCC
2. The Countryside Commission (CC) (serving England and Wales) and the Countryside Commission for Scotland (CSS)

The Countryside Commissions place far greater emphasis on recreation and parks for people, whereas the NCC focuses on nature conservation. Their founding remits are one and the same, "The Conservation of nature" and the enhancement of "natural beauty." The CC define natural beauty as "the interaction of flora and fauna, geographical and physiogeographical features." However, when the 1981 Wildlife and Countryside Act is studied exactly the same definition describes the role of the NCC.

The original five areas selected as sites for National Parks all have multiple ownership, with public ownership usually less than 10 percent. At lower altitudes all have extensive tracts of land which have been moulded and modified by management. Many visitors do not realize that the heather strewn hills and glens are such a result; natural heather habitats exist only at the interface between the upper limits of forest and the sub-arctic zone.

Grouse shooting creates a distinctive landscape pattern. Many areas exhibit a mosaic of form and colour caused by periodic burning.

The existing National Park system in England and Wales has three main weaknesses:

1. It is cosmetic—little power exists to influence the forces that are reshaping the economic and social structure of the countryside.
2. Each park is controlled not by Central Government but by local authorities, to whom nature conservation is of low priority with a correspondingly low level of annual expenditure and staffing.
3. The system relies primarily on planning designation to control specific forms of development and change of land use. Positive incentives to encourage good land use are insufficient.

A study group on Countryside planning and development at the 2nd Countryside Conference in 1970 argued the question: Why are there no national parks in Scotland? Why indeed does the Government remain opposed to the concept, when Scotland, which is internationally recognized as having superb natural beauty, attracts millions of visitors each year? The Scottish Tourist Board admits that the beauty of unspoiled scenery in Scotland attracts more people than any other factor.

Use of terms like "wilderness" applied to Scotland's natural heritage can be counter-productive if misused to describe low land with human settlement. However, away from such areas there are large tracts of the Cairngorms which represent some of the best wild country left in Western Europe.

THE CAIRNGORMS AREA--TECHNICAL REPORT AND OTHER RECENT PROPOSALS

Five County Councils were commissioned by the Scottish Development Department to produce a Technical report on the Cairngorm Area in 1967.

After 18 meetings a detailed plan, including proposals for development, which highlighted possible ways of increasing the

region's economy was distributed for consultation. Incredibly the ecology of the Cairngorms was largely overlooked and its principal ingredient, the natural environment was neglected. Even if some of the main recommendations had been implemented, the area would quickly have become one massive recreational playground and not a single hill would have been inviolate.

Developments proposed during the 1970s and early 1980s included:

1. Numerous additional main and secondary roads.
2. Ski-tows and overhead cable cars east and south of Cairngorms on the Ben MacDhui plateau.
3. The siting of an alpine village.
4. An airport in Glen Quoich.
5. Cableway/monorail from Aviemore, helicopter pads.
6. Mineral extraction up to nearly 1000m above sea level.

The Grampian Regional Council published a report in February 1984, in which the Cairngorms were described as "The most outstanding natural scenic area in Grampian Region and are of national and international importance for recreation and nature conservation." The lack of any integrated planning policies and management guidelines for this outstanding area was a cause for serious concern. In the absence of any legislative provisions for special parks and the inappropriateness of regional park designation, the Regional Council considered that this Structure Plan presented an opportunity to harness the diverse interests and expertise to secure a satisfactory framework for the future of the Cairngorms.

To this end, the report proposed that the Regional Council, in consultation with other regional councils and interested parties, would produce a planning framework and management

plan for the Cairngorms. This would establish policies and proposals that will act as guidelines for the conservation of the Cairngorms, in a manner befitting a resource of national and international significance, and safeguard the aspects which give the area such status.

RECENT EXAMPLES OF INAPPROPRIATE MANAGEMENT AND DEVELOPMENT IN THE CAIRNGORM REGION WHICH IDENTIFY THE NEED FOR A NATIONAL POLICY TO CONSERVE OUR HERITAGE

- * Many poorly constructed bulldozed tracks have been built on many mountain slopes, causing great damage for the landscape and much erosion.
- * Muirburn, often carried out without adequate expertise, has spread into the native pinewood and up into the fragile soil cover on the higher moors.
- * Ecologists and the Deer Commission agree that the number of red deer greatly exceeds the carrying capacity of the area. No action has been taken to reduce deer stocks down to ecologically appropriate levels.
- * Unnecessary grubbing out of natural pine regeneration has occurred in areas where it should be permitted to develop.
- * Areas of native pine forests (Abernethy) have been cleared felled with the Government Forestry Service (Forestry Commission) sanctioning the damage.
- * 1984, tracks were constructed through the ancient pine forest at Rothiemurchus.
- * November 1984 a landowner was accused of "vandalism" for constructing a bulldozed road through Glen Ey, one of Deeside's most beautiful glens.
- * Glen Feshie has also fallen victim to the bulldozer. (Access to Glen Ey and Glen Feshie were built without planning permission).

* August 1986 the Secretary of State's decision to permit the erection of 4.5 km of snow fencing within the Northern Corries SSSI of Cairngorm.

REASONS FOR ESTABLISHING A WORLD HERITAGE SITE IN THE CAIRNGORM REGION

Existing conservation legislation created in the 1940s reflects an early stage of the British people's attitude towards their environment; it is of little significance to present rate of change and what will occur in the future is anybody's guess.

Since 1974, the number of people visiting the area to enjoy the delights of the Cairngorms has increased beyond all expectation. This level of public participation requires more positive planning to provide visitor management and control.

The retention of the Cairngorms heritage must be the overriding factor when considering development proposals. Further, public ownership in itself is inadequate, the Cairngorms must be managed by competent people conversant with the needs of conservation and development and backed by politicians and civil servants. Nothing is yet irretrievably lost, we must get across to the decision-makers that time is fast running out and international status is urgently needed. The Cairngorms must be safeguarded as a national asset to ensure that present and future generations can enjoy some of Scotland's most magnificent mountains.

CONCLUSION

Let us hope that Scotland's natural heritage will be properly protected during the 1990s in preparation for the 21st century and her national conservation policy will include the establishment of a World Heritage Site in the Cairngorms.

APPENDIX 1

Resolution Passed by the Plenary Session 3rd World Wilderness Congress, 14th October 1983

The 3rd World Wilderness Congress welcomes the announcement that the British Government has decided to ratify the World Heritage Convention. This Congress believes this is an important step promoting the conservation of the most outstanding sections of the National Heritage of Britain and recommends that information is provided to people, both locally and nationally, on the benefits to be gained.

The Congress also recommends that appropriate financial arrangements are made for each World Heritage Site to ensure its proper use and management, to encourage research, and to stimulate the support of local people.

Furthermore, this Congress based in Forres, Scotland, strongly recommends that the U.K. Government, after consultation with local and international interests, urgently consider the creation of World Heritage Sites in the Scottish Highlands and gives priority to such a site in the Cairngorms Area to protect the full range of mountain, forest, and wetland environments.

This Congress hopes our International Committee will be able to report to the 4th World Wilderness Congress in 1986 that effective action has been taken to implement the above recommendations and thereby to provide a leading example to the International Community of the benefits and be gained from the establishment of the World Heritage Sites.

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CHOOSING PARK MANAGEMENT STRATEGIES: THE TENSIONS BETWEEN PROTECTION AND USE*

RICHARD J. McNEIL

INTRODUCTION

In the establishment and development of national parks and wilderness reserves, many nations have followed the early U.S. model which precludes residency and most activities involving harvest of resources. It is assumed that this approach protects parks and wilderness values while allowing for recreational, educational, and scientific uses. However, this model sometimes makes the very designation and establishment of parks more difficult and sometimes decreases the chances for necessary cooperation with local people. In addition, the new uses may cause more damage than did the old.

DESCRIPTION OF PROBLEM

National parks and equivalent reserves are recognized generally as important and growing in importance for their environmental, social, and economic values. New parks are being established and policies are rapidly being developed for older parks, many of which existed until recently primarily as areas described by law and delineated on maps but with little coherent policy and little or no management.

Human uses of national parks create tremendous pressures, impacts, and potential for irreversible damage, as well as important positive values. These uses vary from legal and illegal residence, to grazing, farming, burning, harvest of living resources and their products

(such as fuelwood and timber, medicinal plants, food plants and animals, furs, skins, hides), other resource extraction activities, to tourism, scientific research, warfare, and high-technology mining.

Many governments are following closely the model of the United States National Park Service and the advice of people with primarily a Western cultural perspective in such organizations as the International Union for the Conservation of Nature and Natural Resources (IUCN), the United Nations Environment Programme (UNEP), and the United Nations Development Program (UNDP).

Many governments, especially in small and in developing countries, have extremely limited resources allocated to planning and policy making. Consequently park management policies are varied, often based on a limited rationale, often with a limited sense of the wide range of policy choices possible. Although attainment of many important park objectives requires a sophisticated understanding of ecological concepts and of sociology and anthropology, park management is frequently entrusted to military leaders, or to officials of tourism agencies or of production-oriented forestry or agriculture agencies.

Indigenous users of national parks are often outside the mainstream of their nation's economy. They may be quite different culturally, quite powerless politically and economically, and uninformed of pending major influences on their lives.

As a result, policies are set which, when enforced, have unnecessarily damaging effects on rare, fragile, valuable natural resources, and on the lives of people using those resources.

*in Krumpel, E.E., & P.D. Weingart, eds. 1992. *Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843*

These policies often include removal of tribal or other indigenous people resident in the area designated to become parkland and the prohibition of many land uses involving the gathering of resources from the land.

METHODS

In an attempt to get a better picture of the many ways that national parks and similar reserves are used, two assistants and I examined data for 492 parks, 228 in the Neotropics and 264 in the Afrotropics. For the Neotropics I used data published by IUCN Commission on National Parks and Protected Areas (1982). For the afrotropical areas, IUCN's Protected Areas Data Unit (PADU) provided me with unpublished data which has just recently become available in published form (IUCN 1987).

PADU has computer-stored narrative data provided by cooperators for thousands of parks and other protected areas worldwide. Harrison (1983) provided a description of PADU's work in maintaining a global database. Standardized forms provide a wealth of information for each area, including material describing disturbances and deficiencies, a section describing special scientific facilities, and for the afrotropical materials, a section describing visitor services. From these data sheet sections we extracted every mention we could find of human activities.

For the Neotropics we examined all of the English-language materials, 228 (55%) of 414 areas described in the publication. For the Afrotropics we examined a sample of 264 areas (about 59% of the total) as they appeared in an alphabetical arrangement by country, from Angola through Somalia.

A typology of deficiencies and disturbances and other human activities was created by grouping the 732 neotropical and 1071 afrotropical items into logical categories.

RESULTS

It seems useful to separate the noted deficiencies from the disturbances reported under "Deficiencies and Disturbances." The

deficiencies, 97 neotropical and 72 afrotropical, represent mainly the reporters' perceptions of a) lack of resources such as staff, equipment, funding, training, protection, b) problems of access or services needed to use the park, c) problems related to insufficient size or ecological inclusiveness of park, private inholdings, undemarcated boundaries, or d) legal status, unclear authority, ownership problems (e.g. for the Seychelles' La Digue Veuve Reserve: "the land belongs to Mrs. Payet").

Among the disturbances noted, a few (12 neotropical, 17 afrotropical) described natural events or conditions such as frequent lightning, epidemic animal disease, tsetse fly infestation, drought, or flood ascribed to natural causes.

After deleting deficiencies and natural disturbances, notations of 500 neotropical and 722 afrotropical disturbances, and of 123 neotropical and 260 afrotropical research and visitor facilities remain. These are further detailed in Table 1.

It should be emphasized that these are very 'soft' data, derived from a large number of reporters at various times using only approximately similar information collection sheets, and then categorized by various judges from narrative materials of greatly varying clarity and detail. Only broad and general conclusions should be drawn from the resultant numbers.

Residency in sampled parks is clearly seen as a disturbance to park objectives. Settlements, squatters, 'invasions', villages (up to 17 in one park), larger urban areas included (up to 20,000 people in one case, "city in park" in another) are characterized as both legal and illegal activities. It is easy to imagine the impact of these larger settlements.

Hunting was usually specifically noted as being illegal (46 of 73 neotropical, 145 of 168 afrotropical mentions). Trapping was almost unmentioned (2 in each region) as was gathering of terrestrial or aquatic resources.

Table 1. Types of Disturbance-causing Human Activities and Structures in Sampled Parks

| Type of activity | Number of mentions in sample | | | |
|------------------------------------------------|------------------------------|------------|---------------------|------------|
| | Neotropics (N=228) | | Afrotropics (N=264) | |
| | N | % of parks | N | % of parks |
| residency | 30 | 13 | 72 | 27 |
| hunting and trapping | 73 | 32 | 168 | 64 |
| gathering | 14 | 6 | 9 | 3 |
| fishing | 17 | 7 | 42 | 16 |
| agriculture and aquaculture | 44 | 19 | 50 | 19 |
| livestock ranching and grazing | 32 | 14 | 93 | 35 |
| forest damage | 65 | 29 | 104 | 39 |
| water pollution | 19 | 8 | 10 | 4 |
| introduced exotics | 16 | 7 | 13 | 5 |
| mining | 12 | 5 | 12 | 5 |
| other physical, biological, esthetic damage | 66 | 29 | 57 | 22 |
| civil disturbances | 0 | 0 | 12 | 5 |
| recreation and tourism | 64 | 28 | 16 | 6 |
| structures: transp. and communication | 28 | 12 | 33 | 13 |
| structures: miscellaneous | 20 | 9 | 31 | 12 |
| scientific research facilities* | 57 | 25 | 43 | 16 |
| visitor service facilities [†] | 66 | 29 | 217 | 82 |
| Total mentions | 623 | | 982 | |

*not listed among deficiencies and disturbances on original data sheets

[†] not a separate category for reporting for neotropical data

Agriculture (including 3 mentions of aquaculture—for fish, oysters, shrimp) seemed to be moderately important as a disturbance; its apparent importance would probably increase dramatically if deforestation for agricultural purposes were counted here. Specified types of practices mentioned included shifting agriculture, dry farming, and irrigated croplands. Livestock grazing was always reported as "cattle ranching" in the Neotropics and always as "grazing" (by cattle, goats, sheep, camels, donkeys, horses, some combination, or simply livestock) in the Afrotropics. Grazing by nomads' livestock was specifically named for 13 afrotropical areas.

Forest damage included principally timber removal (logging, lumbering), "deforestation", sometimes noted as specifically for eventual conversion to agriculture or ranching, fire, plantations, and firewood cutting, the latter mentioned as a problem only in the Afrotropics.

Recreation and tourism activities were more frequently cited as problems in the Neotropics. Most often mentioned were aquatic activities, disturbance to colonial nesting birds, and overuse and wear. The category of "other physical, biological and esthetic damage" included other activities of tourists such as littering, leaving junk and garbage, accidental fire, vandalism and theft. Many items in this category, and of unspecified origin or detail, may have been tourism-caused ("soil compaction", "wildlife disturbance", etc.).

Structures for transportation, communication, and miscellaneous purposes (48 neotropical and 64 afrotropical) were among the listed disturbances. Data sheets also listed in separate reporting paragraphs scientific research facilities and, for Afrotropics only, visitor facilities. Together these represented 495 mentions of structures of an amazing variety, including: railways, principal highways and other roads, airstrips (1 neotropical, 14 afrotropical), fences, electric power transmission lines, communications towers and antennas, cable cars, lighthouses, oil wells, lumber mills and forestry camps, dams, police posts, oil pumping station, meteorological

stations, mining structures, cattle kraals, fish farm laboratory, boreholes, military bridges, quinine processing station, etc.

Visitor services included the expected administrative centers, museums, educational and interpretive buildings (and signs, trails, etc.), zoos, animal orphanages, hotels, lodges, campgrounds, picnic areas, golf courses, ski lifts, observation hides and towers, restaurants, refreshment buildings, toilet buildings, artificial reef, docks, boat launching ramps, beach houses, shelters, arboretum, stores and shops, etc. Scientific research facilities included laboratories, libraries, herbariums, housing accommodations, etc. Some of these, of course, are very simple; others represent elaborate resort complexes. Facilities for staff other than scientists are not included in this litany of structures.

The fences mentioned refer mainly to the so-called veterinary fences used in Africa to separate and control movements of wildlife and domestic livestock in hopes of reducing the spread of serious diseases.

DISCUSSION

The human activities reported to IUCN's PADU and summarized above represent behaviors which may be categorized as follows:

1. destructive or incompatible under almost any land-use objective (e.g. vandalism, theft, riot, civil war, wanton destruction of plant or animal populations)
2. harmful, neutral or beneficial, depending on land-use objectives and assuming moderate levels of activity and moderately resilient environments (e.g. subsistence hunting, gathering, fishing; extraction of timber and related resources; low-technology mining; residency, extraction of grass and other fodder; recreation and tourism)
3. generally positive or beneficial under many land-use objectives (e.g. non-consumptive scientific research, education, scenery viewing). Many areas now in parks

have undergone large changes in objectives and therefore in policies and management practices. Before becoming parks many areas of wild lands were simply without objectives. People lived there, usually in small numbers and low densities. Their demands on the land were limited and their power to create change was small. A long co-evolution often resulted in social systems and behaviors which effectively maintained suitable living conditions for them. The implied "objectives" for the land were a) a home for people, b) a source of goods (natural resources such as plant and animal products, water, certain minerals), and c) source of services (protection, home for ancestors and spirits, inspiration and guidance, etc.).

On becoming a park, new policies are produced stemming from objectives (usually) related to the provision of quite different goods and services such as: income, especially foreign exchange; national pride; scenic beauty; scientific information; recreation and tourism, especially as they generate income; education and scientific research.

In making such a radical change in objectives we have sometimes made a major mistake in assuming that land uses must always also change in major ways. A second driving force is that we assume that we should follow the typical U.S. model for a park, in which human residency is not normally allowed and resource extraction is not allowed. Commercial activity, except the provision of recreational support services, is usually precluded.

Two important negative consequences commonly result from this way of thinking. First, we mistakenly classify as harmful many activities which may be neutral or beneficial in terms of our proposed objectives. Second, we alienate local people whose cooperation is often vital or at least valuable to the successful establishment and operation of a park. This cooperation is enhanced if traditional activities can be wholly or partly accommodated by park policies. Also, many traditional activities have positive values for attainment of park objectives.

Mountain gorilla habitat is enhanced by the activities of shifting cultivators who leave behind them a mix of dense undergrowth of varied ages and composition. Western (1982) provides an excellent example of the integration of the local Masai people's, and their cattle's, needs into park policy in Kenya. Berwick's (1976) work in the Gir Forest of India demonstrates the need to assess carefully the value of maintaining local activity at appropriate levels in a park; in this case grazing cattle provided an important food source for the only remaining Asiatic lions but also upset many aspects of local ecosystems. Harvest of grass in Royal Chitwan Park in Nepal is a remarkable example of allowing the harvest of park resources by local people (Sunquist 1984).

Finally, many activities which are legitimized in park policy, and indeed are often the rationale for the creation of parks, may be threats to the ecological integrity of park lands and to the preservation of wilderness values. Roads, museums, administrative and maintenance buildings, hotels, restaurants, research laboratories and field equipment, and education and interpretation facilities may cause much larger impacts than did earlier, particularly subsistence, uses. Park-related activities which attract large numbers of people certainly are in tension with wilderness values; indeed wilderness values may be enhanced by maintenance of subsistence activities of local people.

SPECIFIC RECOMMENDATIONS

For park policy makers and managers:

1. Make sure objectives are clear and, to the extent possible, noncontradictory:
 - a. Whom is the park intended to benefit? in what particular way?
 - b. How will these benefits be ensured? at what costs? to whom?
2. Put parks management under environmental, rather than tourism, authority.
3. Pay special attention to needs and interests of local people:

- a. Do people live in or near the (proposed) park?
 - b. Do local people have access to information and power?
 - c. Are policies being set (partially) by and/or in concurrence with local people?
4. Pay special attention to potential disruptive effects of roads, mass tourism, and mass recreation, particularly that which does not need a park setting.
 5. Make concerted efforts to reduce or remove non-park-related structures and activities such as military training activities or power transmission lines.
 6. Be careful not to make previously legal activities illegal without substantiating a) the need for control of the activity and b) the high probability that a reduction in the activity can be achieved. If, for example, local people have no other source of firewood, declaration of a park boundary and a prohibition on collecting wood will simply produce alienated law violators.

FOR INTERNATIONAL LEADERS:

1. Try not to oversell the Western idea that parks should be without residents and without modest levels of resource extraction by local people.
2. Apply social pressures when policy makers use inappropriate models, neglect local people, produce policies which sacrifice long-term park values for short-term goals. Park and wilderness planners and managers should carefully evaluate their objectives. Local needs for certain low-impact uses can be compatible with national objectives such as enhancement of tourism and with global values such as the preservation of wilderness and of biological and cultural diversity.

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EXTRACTION OF NON-RENEWABLE RESOURCES FROM WILDERNESS: A DILEMMA OF SCIENTIFIC USE*

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ABSTRACT

A significant set of new issues in wilderness management has emerged regarding management of areas emphasizing maintenance of natural ecological processes. These issues have been brought to the forefront by the United States Department of the Interior's Bureau of Land Management wilderness process. This process involves predominantly low elevation, desert-like lands which contain abundant paleontological and cultural resource values. In this paper, the word wilderness is used in a general context referring to land classifications whose primary purpose is the preservation, protection and maintenance of natural ecological processes that have shaped the physical and biological character of the setting.

The discussion of these issues is not a reiteration of the ability of a given scientific inquiry to be accommodated in a predominantly natural system. Instead this paper concentrates on the dilemma presented by proposals to conduct consumptive or extractive types of scientific investigations in wilderness that involve the collection of finite, non-renewable resources. This issue is not presently debated in wilderness management literature.

The subject is a polarizing one with the potential loss of scientific knowledge contrasted with the loss of wilderness resources. The significant lack of organizational policy clarifying scientific use in wilderness has contributed greatly to the current issue.

Resolution of this dilemma through policy formulation may set precedents with ramifications that go beyond the initial issues raised. Resolution could have international implications in defining the mission, goals and objectives for the administration of existing and future land classifications whose primary objective is to maintain natural ecological processes.

The point of this paper is to define the issue, speculate on its ramifications for the effective maintenance of natural processes, call for creative problem solving and policy resolution, and instill the potential authors of such policy with a consideration for the importance of their precedent-setting position.

INTRODUCTION

As a case in point, consider the following example. Some time ago wilderness visitors discovered what they believed to be a dinosaur femur. Resource education students have since utilized the site for scientific studies in context with the natural environment. Upon inspection of the site, a university professor secured a research grant and applied for an excavation permit. The request called for stabilizing and collecting the fossil for study under laboratory conditions to extract its scientific significance. Preliminary assessments indicated the find was located in the rock formations near the Cretaceous-Tertiary Age boundary. This could yield scientifically valuable information which may add to the knowledge of events that led to the demise of the dinosaur era and the emerging domination of mammals - a long-standing mystery.

Upon processing the application two contrasting alternatives were considered. First, if the permit was approved, the fossil would be

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removed from the wilderness for the purpose of science. The fossil could also be placed in a museum or be used in the classroom. Second, if the permit was denied, the fossil would remain in the wilderness for primitive recreation opportunity and natural laboratory study as well as maintaining natural systems with minimal human disturbance. These uses are also important considering fundamental values of wilderness preservation.

Applicable law, regulation, and policy were carefully examined only to find little administrative direction on this subject. A literature review resulted in no previous case examples. The professor emphasized that existing technology required the removal of the fossil to protect the integrity of the scientific data from destruction by natural erosional forces. The preservation of fossils for scientific purposes and the preservation of fossils for wilderness purposes were causes worthy of the utmost consideration and both derive a public benefit. Political pressure mounted from the wilderness and scientific communities and the grant money hung in the balance.

What would your decision be? Would you issue the permit at the expense of scientific values?

Initially, scientific use of wilderness was assumed to be compatible with, and beneficial to, the long-term preservation of natural ecological process. Scientific use of wilderness was also assumed consistent with the social intent of designation. One social value - knowledge gained - was assumed to go hand-in-hand with the other - preservation of a natural ecological order.

A long standing debate has centered on scientific uses in wilderness and its affect on the attributes of naturalness and solitude. Traditionally, the debate has focused on mitigation of impacts from motorized travel, use of mechanized equipment, placement of structures, on-site instrumentation, and the resulting human-induced changes to natural ecological processes. This paper extends this debate and raises questions concerning the inherent compatibility of consumptive-extractive types of scientific investigations which involve the removal of finite resources from wilderness. This paper does not focus on mitigation of physical impacts, but on the

dilemma of whether to extract and remove non-renewable resources from wilderness. The question of the loss of wilderness values compared to the loss of valuable scientific knowledge and the broad question of the public benefit from each management choice is explored.

The science of paleontology often requires removal of exposed fossils from the natural setting in order to protect valuable scientific information from destruction by natural erosional forces. Under certain resource conditions cultural resource management also dictates the need for physical removal of cultural materials. The removal of finite resources in these disciplines is for the primary purpose of expanding the body of scientific knowledge at large, not of furthering wilderness management efforts or explaining the wilderness phenomenon. This is an important point to note as this represents a deviation from the majority of the scientific investigations to date.

The vast majority of studies undertaken in wilderness have used a methodology based on gathering information about resources and uses (Lucas, 1987 and Butler and Roberts, 1987). A few studies involved extraction of renewable resources such as tree coring and wedging samples, water sampling for acid rain studies, and collection of plant and animal specimens. A common denominator of these studies reflects the investigation was initiated to explain the wilderness phenomenon, better understand basic ecological functions and/or facilitate wilderness management. No examples were found that involved removal or collection of non-renewable resources or debated the compatibility, or lack thereof, of extracting finite resources from wilderness.

DISCUSSION

Many worldwide classifications focus on maintenance of unaltered environments, the preservation of naturally functioning ecosystems and protection of basic ecological processes and conditions. The universal values of these natural systems are well documented and the multiple benefits society derives are directly tied to the continued integrity of natural ecological order. One of the universal societal values gained from maintaining such areas is that they are available

for scientific use. In fact, scientific use is often cited as one justification for the classification and designation of wilderness. "There remains the persuasive argument that science and scientific inquiry offer an important way of justifying the significant investment that society has made in the wilderness system" (Stankey, 1987).

This paper does not challenge the merits of scientific use in wilderness in a generic sense nor does it attempt to clarify the U.S. Congressional intent of the Wilderness Act of 1964. It does recognize that lawmakers may not have anticipated the ramifications of their language in regard to administering consumptive-extractive scientific uses in wilderness, and further, calls for a thoughtful, in-depth consideration of the subject.

The theme of any scientific use of wilderness is frequently a highly polarized debate, with historic roots that run deep. Stankey (1982) states, "Natural areas represent a precarious point of contact between nature and society. Their very establishment is founded typically on the presence of substantially unaltered natural conditions, but much of their justification and rationale is founded upon their utility to society."

On the surface, one might expect that protection afforded the natural environment by wilderness would seek to benefit both wilderness and scientific values. Frequently, it does just that. The point of controversy examined in this discussion stems from the apparent conflict with allowing freely functioning natural conditions and basic ecological processes to proceed in wilderness with minimal human-induced interference and disturbance. Can we indeed retain wilderness value and character while at the same time physically removing finite, non-renewable components?

It is important to differentiate between actual maintenance of natural processes and the cosmetic appearance of maintaining natural processes. Franklin (1987) states, "Wilderness management has focused on cosmetic rather than substantive issues. Wilderness users and managers are more concerned with the appearance of naturalness than with understanding and maintaining natural processes." If the site of investigation generally blends in with the surrounding environment or has an overall

"attractive" appearance, then managers are satisfied that natural processes have been maintained.

Wilderness values and most scientific use of these values to date, operate at an optimum under the previously described conditions. However, exposed fossils or cultural properties which may contain scientifically valuable information are subject to natural erosional forces in wilderness and are therefore endangered. These natural forces act to disintegrate the material and destroy the integrity of scientific information, rendering fossils impaired for knowledge gathering.

Not only are specific cultural properties subject to erosion, but the context in which they originally existed is destroyed, a reality equally detrimental to cultural resource investigations as loss of the physical properties themselves.

The collection of scientific data for the purposes of better understanding wilderness (i.e. administration of visitor use) generally lend themselves to basic mitigation of the effect/impact of the proposed study on the wilderness resource. This is primarily because most investigations have focused on the collection of data about natural ecological processes, or social processes. The act of collecting finite resources, such as fossils and artifacts is by the large unmitigable since specimens are removed from the total context of the natural ecological processes, surface and subsurface. The resources are removed and their contributing values are rendered unavailable for the purposes of wilderness, but are salvaged for the purpose of science. Wilderness character and natural ecological processes have been tampered with.

Thus, the dilemma...does the wilderness manager allow destruction of potentially significant scientific data in order to preserve wilderness values? Or does the manager allow the removal of fossil and cultural material to facilitate the preservation of scientific knowledge at the expense of wilderness values? Which is the greater social benefit or can there be compromise? Which constitutes the greater social merit, in both the long term and the short term?

MANAGEMENT IMPLICATIONS

The administrative philosophies used to guide management of such environments fit predominantly into two major schools of thought; anthropocentric and biocentric. The anthropocentric approach facilitates direct human use of wilderness and the biocentric approach emphasizes preservation of natural ecological order. Both are implemented to varying degrees and each produce a different conclusion when used to guide the maintenance of the integrity and viability of a given natural system. Somewhere between these divergent philosophies lies the social and political reality of natural resource management. It is here, in this massive gray area that the greatest opportunity exists, that the greatest creativity will be demanded, and where the greatest risk is inherent. A hasty, ill-informed policy development puts at risk all the values wilderness managers pride themselves on protecting and facilitating.

People make management choices in an ideologic context crucial to the making of those choices. This ideology is inherently a political choice. An overwhelming political theme of any wilderness management scheme is to preserve and protect the natural ecological processes contained therein. To deviate from that dominant theme, a greater public good must be justified. Any policy developed for administration of wilderness must establish the rules for determining this greater public benefit and must also consider the concepts of short or long term greater public good. Stankey (1982) states: "It is necessary to build a logical and defensible framework that provides a clear statement of rationale." If we cope with the removal of finite resources from wilderness on a case-by-case or wilderness-by-wilderness basis avoiding comprehensive policy formation, managers will "risk performing as mere mechanics, tinkering with bits and pieces of the environment, but with no clear appreciation of the whole. To proceed with management actions on a piece-meal basis is roughly analogous to devoting one's energy to polishing the ship's brass while sailing uncharted waters".

Those who construct policies which concern the extraction of finite, non-renewable resources such as paleontologic and cultural re-

sources must come to terms with a multitude of such philosophical questions. A sample follows:

-Which is philosophically compatible, desirable, or practical with managing wilderness - the physical removal of a finite resource or removal of data gathered on that resource? Are extractive uses, regardless of the individual discipline, consistent with wilderness administration in a manner which will preserve naturalness and leave the area unimpaired for future use and enjoyment as wilderness?

-Ultimately, is society dealing with a fixed supply of wilderness? How will this influence society's valuation and this dictate its choices? How does one value, and therefore plan for, the future option to study? Does the piecemeal removal of component parts result in impacting the system as a whole, and what effect does this have on future options to study? If the physical specimen is removed the option to study in situ is eliminated. If the specimen is destroyed by natural forces, this option is also eliminated. What future social good might be sacrificed by removal of a non-renewable, finite resource? What scientific knowledge is sacrificed by not allowing specimens and artifacts to be removed?

-Should paleontologic and cultural resources in a primitive setting be made available to wilderness visitors? Is the recreational, educational, scientific, and religious use of such scientific resources something the manager wants or needs to preserve in wilderness?

-Will policy makers base their recommendations on an archaic social value system as compared to an emerging new social value system? Policy makers should be cautious in designing policy strictly based on existing social and moral attitudes toward natural systems. It is incumbent upon them to project future needs based on reasonable indicators of future shifts in moral, political and economical attitudes toward natural systems.

-What about considering selective sampling of "banked" resources - (resources left within their subsurface context, for future technologies to access in a selective manner)?

-Will policy regulating who gains access to a given field specimen be developed? How would this be enforced? Would the resource manager be coping with an unrealistic, too intensive management philosophy?

-Is disturbance of the subsurface ecological context through excavation as significant as the disturbance of the surface ecological context? Does one function without the other? Is one valued more than the other? What values are accrued by the study of one element when removed from its overall context? What values are lost?

-Will existing wilderness designations that contain resources of significant scientific value be declassified in order to retain the integrity of the wilderness concept or has society, via its ideologic or political choice, made a decision to forgo the scientific paleontologic and archeological values contained in wilderness when the decision was made to preserve natural ecological processes? Are designations other than wilderness more appropriate?

-What are the potential impacts resulting from the removal of finite resources contrasted with that of the removal of renewable resources? Does removing a fossil or artifact from wilderness constitute an irretrievable or irreversible impact upon the wilderness resource?

When policy makers come to terms with the broader, philosophic questions surrounding the physical removal of finite, non-renewable resources from wilderness, more site-specific, or field-practical guidance must be designed. Given the assumption that a good philosophic construct has been created, this process should take place with considerable less trauma than it would have otherwise.

-If policy demands a clarification of common scientific specimens as opposed to significant specimens, who determines significance; the scientist, the manager, peer review, or a consortium of involved parties? Who determines the criteria for significance? When designing a process to determine significance as a criteria on which to base extraction or non-extraction the question must be raised: significant to whom? Of

value to whom, and why? To the scientific body of knowledge at large, to the reputation of the individual researcher, to the casual recreationist, or to the society at large? Which society...Anglo, Hispanic, Pueblo or Navajo?

-Will technological advances in the foreseeable future allow the gathering of scientific data without the physical removal of the fossil or artifact from its ecological context? Is it incumbent upon the scientific community to develop a cadre of essentially non-impairing techniques? Should the development of scientific investigation techniques which stabilize specimens in wilderness be pursued, thus providing a permanent banking of data? Is it possible some specimens may be adequately "curated" in the field as well as in a museum, with less disturbance occurring to the natural systems?

-What are the projected cumulative impacts on the natural ecological processes of wilderness resulting from scientific studies involving extractive uses when combined with grandfathered uses and off-site influences?

-What would the physical disturbance or removal of a cultural resource mean to Native American culture? Many prehistoric sites are used as religious shrines. How can a manager begin to establish a rapport with Native Americans in order to establish a dialogue on the subject? Frequently, Native Americans are reluctant to reveal locations or significance of sites to those outside their religion or social framework. That information is considered proprietary.

Beyond these basic inquiries a myriad of questions specific to the ecological composition of the wilderness, and the nature of the cultural or paleontological investigation being considered, will dictate their own specific policy and field determinations.

CONCLUSIONS

The dilemma centers around the values associated with a product of environmental processes, rather than the values associated with the environmental processes directly, and the fact is that if we do not garner these products, they

could readily be lost. Resolution can only be accomplished by making social judgments or basically, a cost-benefit analysis. What gains, what knowledge will be derived by collecting products of the environment and what losses to the integrity of natural processes would result?

Development of good criteria to make such a social judgment would seem vital. Such criteria should establish a scale of disturbance - what really constitutes an impairment of ecological processes? Wilderness managers have established such parameters for recreation use. Perhaps such a system would be applicable to managing proposals for extractive scientific uses; a "limits of acceptable change" system designed specifically for scientific investigations which require the physical removal of finite resources from wilderness. Developing criteria that will assist in establishing the uniqueness of the scientific resource in question is essential to effective management. What is the relative availability of such a resource? Can the same level of data be gathered outside the wilderness? One of the inherent problems in developing such criteria is that we frequently do not know definitively, the relative rarity or uniqueness of such resources until the investigation is complete.

The decision is inherently a difficult one to make. It would seem useful to make several broad recommendations:

-Both managers and scientists have a responsibility to resolve this issue and make attempts to reduce the 'professional snobbery' that is prevalent in both resource managers and scientists.

-Streamline logistical and regulatory systems to facilitate dialogue. Although it is a challenge within any bureaucracy, it is not an impossibility.

-Do not forget the crucial role of the citizen-at-large in developing such criteria.

-Consider the use of an advisory council composed of scientists, managers and citizens to establish and monitor criteria development.

-Maximize the creative process when selecting and designing research technologies. Accept wilderness as a resource unto itself, and be

open minded about adapting traditional technologies to this resource. Perhaps an interdisciplinary approach to such a creative process may be the most productive and expedient.

Much of the difficulty in resolving questions raised when defining policy concerning the removal of non-renewable, finite resources from wilderness, has been summarized by George Stankey (1982). He argues that "a successful program of natural area preservation must rest on three components. First, it is necessary to build a logical and defensible philosophical framework that provides a clear statement of rationale...Second, a solid data base regarding the resource and its use is needed. Third, there must be an effective delivery system - a management system...". He further adds a note of caution: "The situation is further confounded by the fact that the consequences of decisions undertaken in the face of uncertainty may be substantially irreversible; thus mistakes are potentially very costly. There is a great potential for committing irreversible mistakes. This would logically dictate a conservative approach to selecting management actions."

Although this aspect of wilderness management is somewhat new, its resolution is no different and calls for a cautious, logical and traceable approach to policy development. Perhaps this is a new wilderness management dilemma, but certainly not an insurmountable one.

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PROTECTED WILDERNESS AS A RESEARCH OBJECT: THE CASE OF URHO KEKKONEN NATIONAL PARK*

HEIKKI KAUMANEN

ABSTRACT

An inventory of an area altered by windthrow was made in the wilderness of Urho Kekkonen National Park in northern Finland. The aim was to collect background data for a long-term survey dealing with the regeneration of virgin forests. Large overstory trees were most heavily represented in by the windthrow, resulting in a conspicuous change in the wilderness. This rare situation now affords unique opportunities for scientific research.

INTRODUCTION

It is commonly accepted that wilderness areas are needed for recreation, for the preservation of gene pools, and for scientific research. Such protected areas are irreplaceable comparison and follow-up areas. Because of their large size and naturalness, wilderness ecosystems furnish scientists with unique research opportunities (Franklin 1987).

In Finland, an endangered wilderness was saved when Urho Kekkonen National Park was established in 1983. The 255,000-hectare park is one of the largest remaining wilderness areas in Western Europe and thus has considerable conservation value (Finne and Ovaskainen 1984). The area has been popular among back-country hikers for decades, but scientific activity has been slight.

In 1985, public attention was given the park when an October storm blew down many trees in the most remote part of the park. Because of their economic value, the majority of

the fallen trees were planned for harvest. However, a negative decision by the Ministry of Environment guaranteed that the trees would remain in the virgin ecosystem. That situation afforded many interesting challenges to scientists.

In 1986, small projects were started in the windfall area. The first aim of this paper is to present some data on the storm-damaged forests, which were gathered as background for a long term survey. The second aim is to describe some opportunities provided by the situation currently prevailing in Urho Kekkonen National Park.

MATERIALS AND METHODS

Study area

Urho Kekkonen National Park is located in northeastern Finland (Fig. 1), in the North European coniferous (taiga) zone. The forests are composed predominantly of Scots pine (*Pinus sylvestris* L.) and to a lesser extent Norwegian spruce (*Picea abies* (L.) Karst.). In addition to forests the landscape of the national park consists of open peatland, river valleys, and alpine tundra.

The study area is in the southeastern part of the national park (Fig 1), in an area containing most of the windthrow. It comprises Jauru Valley and a number of surrounding forested hills. The valley's bottom and the northern slope are covered by pine forests. Both pine and spruce forests are found south of the Jauru River. The stands are characterized by a broad age distribution but a few generations. More than 400-year-old pines are typical of some stands, but there are also stands

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in the thinning stage. Charred stumps and fire scars indicate that the forests of Jauru Valley burned in the past.

Field Survey

The first examination of the windthrow was done by walking through the area. Later, damaged areas could be recognized on infrared images produced by Finnmap Oy on June 26, 1986. Sixteen rectangular plots, 40 by 40 meters in area, were subjectively located in the stands of the central part of the windthrow area. Plots were located on the valley bottom, on both valley slopes, and on some hilltops. One of the stands studied was dominated by spruce, another was a mixed spruce-pine stand, and the rest were dominated by pine. Three reference stands were without storm damage (Table 1). All plots were marked with wooden stakes for remeasurement.

All fallen and standing trees, were measured in the plots. Species, diameter at breast height (DBH), and height (h) were recorded for standing trees. For windthrow, height increase in the last 5 years and pit area

were measured. Six of the largest trunks of fallen trees were cored for a determination of stand age. Every plot was photographed for future comparisons.

RESULTS AND DISCUSSION

The October storm of 1985 felled trees on hilltops, on leeward and windward slopes, and even on the bottom of Jauru Valley. The most extensive and heaviest windthrow occurred on windward, middle slopes (Fig. 2).

The highest velocities of the gusty storm on 16th October 1985, measured at the Sodankylä Observatory, were less than 25 meters per second. Wind velocities in the study area may have been much higher. Obviously, the severity of the damages was due partly to the topography's having accelerated storm winds.

Stand density in the plots at the time of the storm ranged from 106 to 662 trees per hectare (Table 1). The highest density was found in the spruce forest plot. The percentage of windthrown trees ranged from 0 to 90 percent (Table 1). Heavy damages occurred not only in

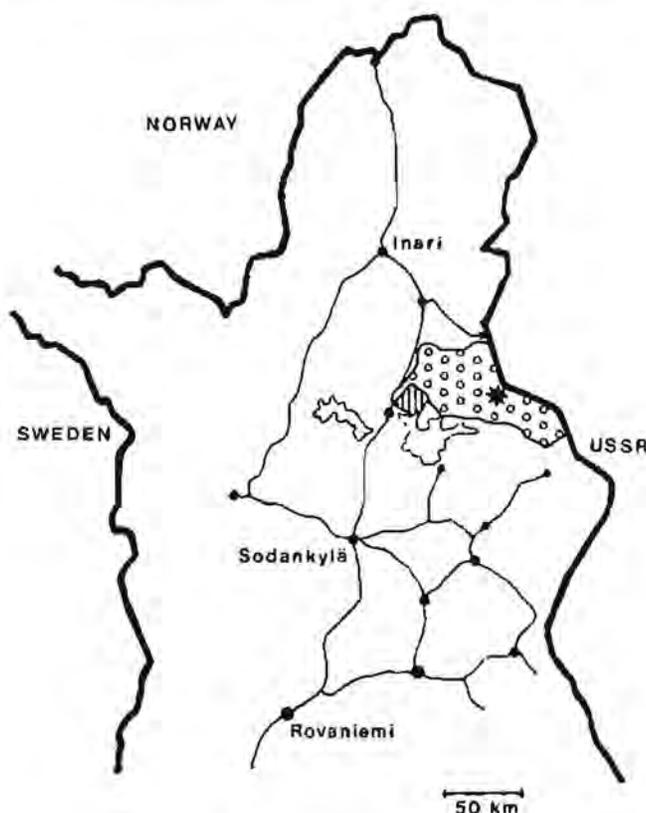




Table 1. Damage to stands of Jaurujoki Valley caused by the 1985 storm.

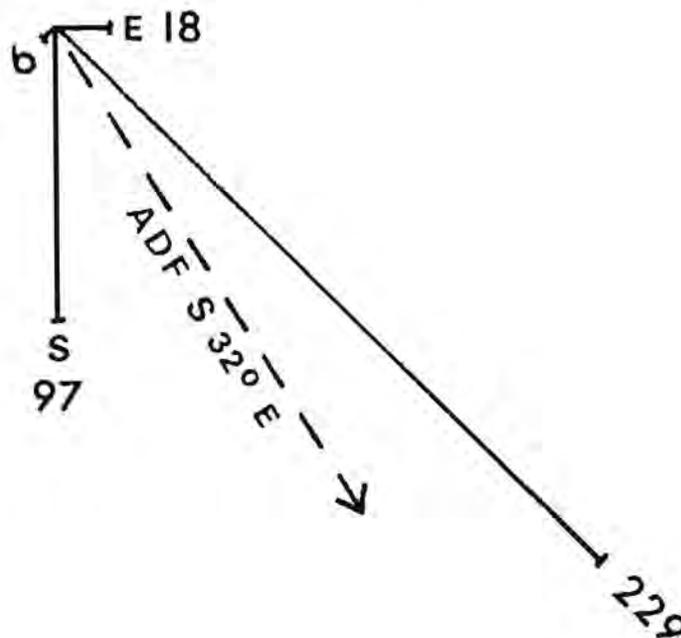
| Plot Number | Number of trees per hectare at time of storm | Percent of trees damaged | Average DBH of damaged trees | Average DBH of undamaged trees | Stem volume M3/HA |
|-------------|----------------------------------------------|--------------------------|------------------------------|--------------------------------|-------------------|
| 1 | 662 | 72 | 16.1 | 8.9 | 78.6 |
| 2 | 487 | 51 | 22.3 | 19.2 | 137.0 |
| 3 | 469 | 17 | 26.9 | 22.1 | 162.4 |
| 4 | 425 | 73 | 17.9 | 14.5 | 76.8 |
| 5 | 394 | 89 | 26.3 | 18.6 | 199.4 |
| 6 | 269 | 79 | 18.9 | 17.6 | 61.9 |
| 7 | 269 | 0 | -- | 22.9 | 96.4 |
| 8 | 250 | 30 | 24.0 | 19.6 | 70.3 |
| 9 | 231 | 57 | 28.3 | 24.9 | 121.4 |
| 10 | 206 | 67 | 28.6 | 23.9 | 93.5 |
| 11 | 187 | 77 | 29.7 | 21.7 | 97.4 |
| 12 | 187 | 90 | 28.6 | 39.0 | 130.0 |
| 13 | 187 | 63 | 24.6 | 10.8 | 42.8 |
| 14 | 162 | 0 | -- | 29.5 | 95.1 |
| 15 | 150 | 83 | 29.7 | 26.3 | 86.6 |
| 16 | 106 | 0 | -- | 19.8 | 32.5 |

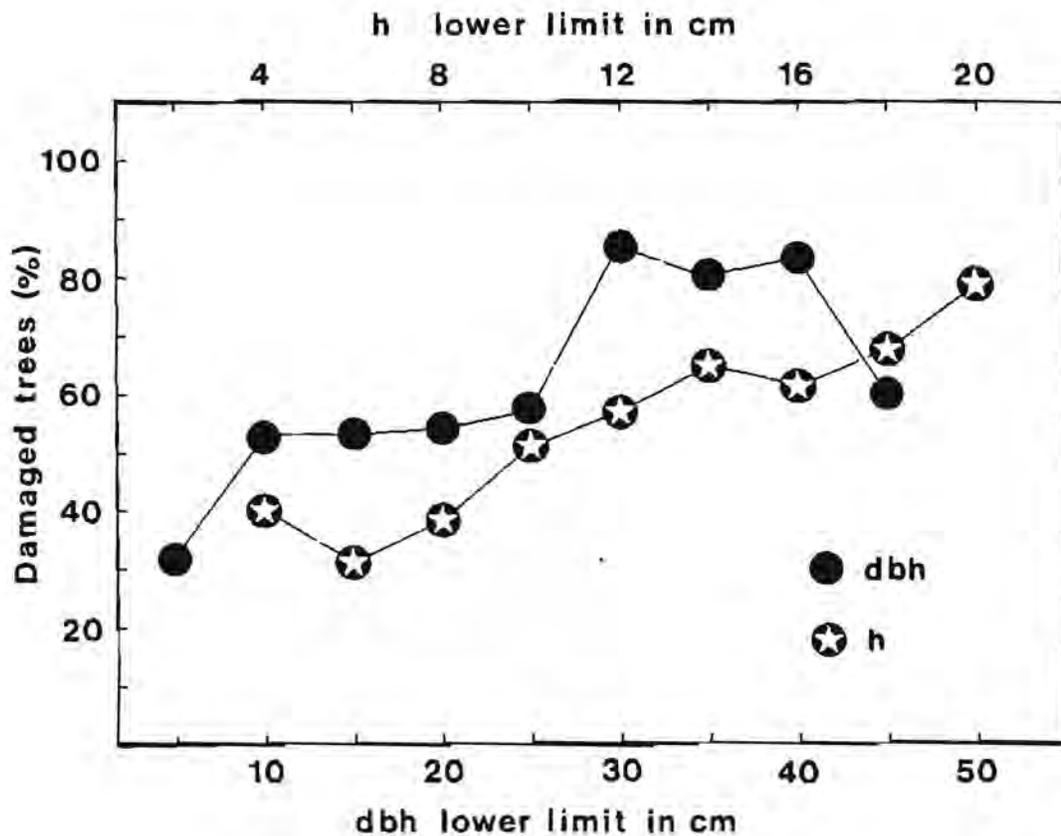
stands of high density, but also in more open stands. Similarly, undamaged stands were found throughout the spectrum of stand densities. Because the plots investigated were subjectively selected, further conclusions about the relationship between damage and stand density cannot be made. The direction of tree fall, mostly southeast, reflected the direction of the storm. The range of directions (Fig. 3) and my observations in the field indicate that the primary direction of fall did not depend on topography.

With the exception of the smallest height class, all diameter and height classes were represented among the fallen trees. The average DBH of the windthrow trees was considerably larger than that of the undamaged trees (Table 1). The proportion of windthrown trees increased with increases in DBH and height (Fig. 4). Thus, overstory trees with dense and large crowns were more susceptible to the storm wind than were suppressed trees. This finding agrees with the results of Brewer and Merritt (1978).

Although the forests of Finland have frequently been damaged by storms (Annala and Petaistö 1978), situations of the type prevailing now in Urho Kekkonen National Park seldom are available to scientists. Windthrow usually is harvested as soon as possible because of the potential damage posed by subsequent insect attacks. Therefore, further research should be directed at the windfall area of Urho Kekkonen National Park.

Windthrow seems to be a factor in regeneration of natural forests (Falinski 1978). Its role in virgin boreal forests can be clarified in the damaged area of Jauru Valley. There are opportunities for many other investigations as well, e.g., root studies and long-term monitoring of bird or insect populations. A study of insect attack on the windthrow was started by Espo (1987) in 1986. His results showed that *Tomicus piniperda* L. was the only common species during the first summer after the storm. This species was found in 83% of the stems investigated. However, 65% of the attacks were unsuccessful.





For a better understanding of the future of damaged forests, it is necessary to consider their past. To this end therefore, a collection of increment cores and samples of fire scars are needed. It is conceivable that in the past windfalls and wildfires have played an important role in the wilderness of Urho Kekkonen National Park. For elucidating the forests' history, tree-rings and fire scars are among the best recorders of environmental change.

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THE IMPACT OF HYDRO-POWER DEVELOPMENT PROJECTS ON RECREATIONAL ACTIVITIES IN WILDERNESS AREAS: A CASE STUDY FROM SOUTHERN NORWAY*

JON TEIGLAND MARIT VORKINN

ABSTRACT

Hydro-power development projects may have displacement and substitution effects among recreational users of wilderness areas. HP projects may also change visitor satisfaction and release latent demand. This study from Norway found the displacement effect large and the latent demand effect small.

INTRODUCTION

Impact assessment is required in many countries as part of the planning and decision-making process of large developments such as hydro-power (HP) development projects. The interest in environmental impact statements, required by the National Environment Policy Act (NEPA) in the United States, seems, however, to be connected with the process before a decision on implementation is made. Development projects are seldom followed with studies of what actually have been the impacts. This is regrettable as such "before and after" studies would probably greatly improve the base for impact statements in the future.

To date, impact statements for the outdoor recreation sector have not been required in Norway. The resistance to new HP projects in wilderness areas has, however, been so strong in the 1970's and 1980's that such requirements are now underway. The latest big environmental battle, where the government had to order 10 percent of the nation's police force to clear demonstrators from the HP development

area (Haagensen and Midtun, 1984), has made such impact studies a necessity. A research program on the impacts of HP projects was started in 1984.

This research program gave high priority to a study of outdoor recreational interests. In a report on the international "state of the art" (Teigland, 1985), the senior author advised that future Norwegian research should focus on measuring the displacement and substitution effects among recreationists related to HP projects, as well as quantifying changes in visitor satisfaction and latent demand. Attempts should also be made to develop a stronger base for the evaluation and weighting of different visual and functional factors. Priority was, however, given to a case study which could provide a "before and after" picture of a HP project.

This paper gives the first results from this case study and shows the effects which a larger HP project in Southwest Norway has had on the recreation interests from the HP project planning started in the 1960's and up to 1986.

THE EFFECT CONCEPTS

Development projects can have impacts both on former recreation users of a wilderness area and on that part of the population which earlier did not use the area. One effect can be that former users choose to use other areas which may be more preferred or attractive after HP development is initiated. This displacement effect means that the former users move their activity to other areas. They also could choose to use the same area as before but change to a new and more rewarding activity (substitution effect) or continue the same activity in the same area

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with a positive or negative change in satisfaction.

HP development also can affect previous non-users of the area. If the development is based on building access roads, the new roads can open the area for new users which would not have come if the accessibility had not improved. A HP development also can raise much media attention which in turn can inform non-users of the attractions in that area.

Media publicity, new accessibility, and development of new facilities, which may stimulate recreation interest, can release a latent demand among former non-users (Figure 1).

THE CASE STUDY AREA, THE RECREATION SYSTEM, AND THE HP PROJECT

The Norwegian Parliament decided in 1969 to give permission for HP development in one of the most popular hiking areas in southern Norway. That area, Aurlandsdalen, is situated 3-4 hours from the two main population centers in the eastern and western parts of the country, Oslo and Bergen, respectively (Figure 2). The main railway between these population centers passes just south of the area, making it easily accessible to the general population. The dramatic natural beauty in the northern part of Aurlandsdalen, where the mountains meet the longest fiord in the world, made the area famous early this century as one of Norway's truly high-quality hiking attractions.

Aurlandsdalen was a large wilderness area according to the Norwegian interpretation of the wilderness concept. The area, with a size of approximately 760 km², had no roads or other modern technical developments, but it had 3 earlier alpin summer farms which provided accommodation and catering services to hikers who followed the old path through Aurlandsdalen. The approximately 70 km-long hike followed the bottom of the main valley after crossing a high mountain plateau in the south. The hike usually took 3-4 days and was

a summer activity, since the descent to the fiord was closed by snow during wintertime (Figure 3).

The original HP plan was to build a construction road and transmission lines along most of the hiking routes as well as 10 dams in the main valley.

The HP plan met strong public resistance, and the Parliament decided on a compromise to leave the northernmost wild part of the area without visible development. The developers, therefore, were instructed to build the construction road inside the mountain—12 miles of road tunnels in the high-quality northern part of the valley. No dams or power lines were permitted in this part of the area, but the water level was reduced in the main river.

Because of these directives, HP developments were concentrated to the mountain plateaus not visible from the traditional hiking route. Large power lines, 2 minor dams, and the main construction road were, however, located in or through the central part of the 3-4-day hiking route (Figure 3).

It was during the implementation period that a decision was made to enlarge the construction road up to national road standards and to make the road a major passage road between eastern and western Norway. An important argument was that such a passage road would open the area up for new users who otherwise would not have the opportunity to experience the nature of this region or to hike the remaining high-quality day use section in the northern part of the area.

The change in nature quality and improved accessibility were the two main concerns in the public debate during the decision-making process which lasted from 1965 to 1969. Several contradictory impact statements were given, according to a collection of all public statements which the Norwegian Energy Department recently released (Vassdragsdirektoratet, 1986).

TRADITIONAL USERS AND THE DISPLACEMENT EFFECT

The main user group before the HP development began was hikers on multiple-day trips. According to the HP developers, the alpin hut managers, and the trekking association, very few hikers used tents when trekking in this area before the development began. Accommodation figures and guest books from the huts served as important data sources on former user volumes and structure. Because one of the pasture farms is managed as a national hiking association hut, the accommodation figures from 1936 to 1986 permitted important comparisons of use and the user characteristics. Guest books from the other huts also exist with data on traffic volume and characteristics of hikers dating back to 1930. Fortunately, the data from these different sources are consistent.

One important characteristic has been that, with very few exceptions, the hikers stayed only one night at each alpin farm or hut, making the accommodation figures a good indicator for the number of hikers passing through the area.

Accommodation figures from a sample of comparable hiking huts in two similar mountain areas without HP developments made it possible to compare the development of the hiking volume in the case study area with other hiking areas in southern Norway.

The hiking volume in Aurlandsdalen increased 110 percent between 1960 and 1968 before the Parliament gave permission for the HP project. This increase was very similar to the development in hiking volumes of the two similar mountain areas (a regression coefficient of 0.93) for the same period.

The hiking volume rose, however, nearly 50 percent in our case study area the year (1969) Parliament decided to permit the HP development. The unusual and dramatic growth is most probably connected with the media publicity the decision-making process created that year and the year before. Part of the unusual growth, however, is probably accounted for by hikers who came to experience the area

before the development started to see the area for "the last time," or who were just curious to see the place that was getting the publicity.

The first effect of the HP project was, therefore, a "publicity and farewell effect." This effect dropped the next year when visitation decreased 25 percent, a reduction nearly down to the level before Parliament's decision.

Three years later, in 1972, when the road was built into the traditional hiking area, hiking volume in Aurlandsdalen started a dramatic descent. Compared with the volume before the HP project started, and with the traffic volumes in the two comparable areas, the number of hikers on multiple-day trips entering the study area decreased by 50 percent. That decrease levelled off by the mid 1970's (Figure 4).

The decrease in hiking volume may be interpreted as a displacement effect of the HP development, in the sense that the former traditional users on multiple-day hikes in Aurlandsdalen are transferring their activity to wilderness areas in other parts of southern Norway. This relocation of the activity to external areas may be called the "external displacement effect."

The traditional users on multiple-day hikes may, however, also react to the HP development by transferring more of their activity to the undeveloped parts inside the case study area and/or by reducing the time spent inside the developed parts of the area. This relocation of activity takes place inside the area and may be called the "internal displacement effect."

The internal displacement effects were also studied in Aurlandsdalen with the help of trail traffic counters, self-registration measures, and a mail survey among a sample of 1300 hikers who used Aurlandsdalen in 1986 (with a response rate of 90 percent). Information on which routes the hikers used in earlier years was collected from the accommodation bills. A more detailed follow-up study on geographic patterns was done in 1987 (under analysis).

The travel pattern study showed that the internal displacement effect was substantial. While 85-90 percent of the multiple-day hikers followed the traditional trail through Aurlandsdalen before the HP project began, only about 70 percent used the same route in the 1980's. After the HP development was completed, a larger percentage of a strongly reduced number of hikers selected routes away from the HP developed areas.

The number of multiple-day hikers who passed through the developed central part of Aurlandsdalen was, therefore, not reduced by 50 percent, but by 55-60 percent in 1986, compared with the last years before the HP project started. Eighty to ninety percent of this reduction may be interpreted as the external effect, and 10-20 percent the internal displacement effect measured in number of hikers.

Some of the multiple-day hikers who passed through the developed part of Aurlandsdalen also chose to reduce the time they spent in that part of the area by using a bus or car to avoid the exploited central area near the new road. Some of the multiple-day hikers chose to start their hikes along the road, however. Only 80 percent of the strongly reduced flow of multiple-day hikers passing through the entire developed part of Aurlandsdalen, hiked the whole 3-4-day traditional route. The average number of days used on the traditional hike has, therefore, also decreased slightly (5 percent) since the HP project started.

The total displacement effect of the HP project (measured in recreation days used on multiple-day hikes in the developed part of Aurlandsdalen) may, therefore, be between 60 and 65 percent.

NEW USERS—RELEASE OF LATENT DEMAND

The new road, which became a national road in 1983, has made Aurlandsdalen potentially accessible to new users; casual tourists on recreation trips and people

specifically interested in using the road as an entrance to the former hiking area. From 1974, the road was a private toll road and did not become a major national thoroughfare before 1983. Toll ticket figures from these early years, together with traffic counter measurements in later years, give us traffic volume information from the time the HP project began.

Personal interviews during summer 1986, among a sample of 300 vehicle travelers, give us detailed information on their use of the study area. Traffic figures show that travel patterns have been relatively stable from 1975 to 1986.

The 1986 survey shows that the high-quality northern part of Aurlandsdalen, which has remained without development, is still mainly used by the traditional users on multiple-day hikes along the traditional 3-4-day trekking route. One-day hikers constitute only 1/3 of the total number of users of that part of Aurlandsdalen.

Eighty percent of the day hikers in the northern area remain members of organized hiking clubs. This suggests the new accessibility has not attracted new user groups, but that the new road has made it possible for the traditional user groups to experience the area in new ways, principally on day hiking.

The through road has not released a strong latent demand for other forms of recreation in Aurlandsdalen. Only 2 percent of the groups travelling the new road who entered Aurlandsdalen during summer 1986 came primarily to use the area for outdoor recreation. Seven percent of the groups did, however, stop along the road. Only a few of the road travelers (3 percent) walked away from their vehicles into the countryside. Most of these walkers went a very short distance. Eighty percent of these people walked less than 1 km (or 1/2 mile) from the road.

As a result, the new road seemed to be mainly a through road to other attractions for the majority of the drivers who were on holiday or weekend trips in the Aurlandsdalen. They experienced the area through the car window,

often without remembering what they had seen a few minutes afterwards when they were stopped for the roadside interview.

One reason for the low use of Aurlandsdalen for hiking by these highway travelers may be that they did not know that one of the most impressive hiking areas in Norway was close by. Ninety percent of the Norwegian drivers who lived outside this region did not know about the trekking route through the area. The publicity during the planning and decision-making period, therefore, has not had a lasting effect among the Norwegian population.

DISCUSSION

The HP project in Aurlandsdalen could be viewed as an experiment with deliberate changes in factors such as accessibility, quality of experiences, media publicity, and with all the known problems with identifying the separate effects from each of these variables.

The implementation of the HP project did take 14 years, which adds to our identification problems. During this time many other important factors may have changed, which may have changed people's interests and possibilities for using the area.

The volume and direction of change in many of these other factors is, however, known from the Norwegian National Holiday and Outdoor Recreation Survey (Central Bureau of Statistics), a series of surveys which began in 1970, the year after the HP project in Aurlandsdalen started. Every four years, up to 1986, the same comparable national survey has been conducted, showing that the levelling off in the 1970's of the hiking volume in general most probably is connected with a strong increase in the flow of Norwegians abroad from 1974 to 1986 (Teigland, 1986).

The sudden decrease of multiple-day hikers in 1972-73 in the study area took place the same year as the construction road was completed into the central part of the trekking route. One possible explanation is that the road and the other HP developments reduced or

destroyed the quality of the area from the multiple-day hiker's point of view.

The reduced quality of the central part of Aurlandsdalen reduced the attractiveness of the whole area for multiple-day hiking. The northern high-quality part, which the Parliament decided to keep without developments, is still viewed as a high-quality area by both day and multiple-day hikers. Nearly all the interviewed hikers in 1986 agreed that the trip through the northern, undeveloped part of Aurlandsdalen was one of the finest nature experiences they had ever had. Keeping this northern high-quality part intact as a wilderness did not, however, prevent a dramatic reduction in the attractiveness of the whole area as a multiple-day hiking wilderness. This shows that a HP project in one part of the wilderness area may reduce the attractiveness of the whole area for some user groups.

Reduced quality of experiences is, however, only one possible explanation for the reduced number of multiple-day hikers. The resistance to the HP project was very strong. The publicity during the resistance period may have given potential hikers the impression that the quality would be reduced or destroyed. That negative impression may have had a lasting effect among the hikers, but not among the population in general. However, the most probable explanation is that the HP project has reduced the quality of the wilderness and nature experiences which the hikers are looking for.

CONCLUSIONS

This "before and after" study indicates that large HP developments in wilderness settings may have a strong displacement effect among traditional outdoor recreation groups who are mainly coming to such areas for nature experiences. That may at least be the case in regions with alternative wilderness areas for the users.

A reduced quality of the nature and wilderness experience is most probably the reason behind the strong displacement effect. In our study, the reduced quality in the central part of the hiking route affected the use of the whole

route, as well as the use of the highest quality areas which were "saved" from development. HP developments in one part of a wilderness may, in other words, have effects in the whole area. That may be the case in wilderness areas where the use is located in corridors through the whole area.

Roads connected with HP developments do not necessarily release latent demand for outdoor recreation. A new road does not itself necessarily create more interest for outdoor activities such as hiking. A road may mainly create a possibility for groups which already are interested in using the area for shorter trips. That may at least be the case in regions which have through roads or access roads to alternative outdoor recreation areas.

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WILDERNESS CRISIS IN THE THIRD WORLD: A REGIONAL CASE STUDY WITH DILEMMAS IN WILDERNESS DESIGNATION AND MANAGEMENT IN SOUTHERN AFRICA*

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INTRODUCTION

This paper focuses in broad perspective on the wilderness crisis in the third world. It touches on some of the dilemmas confronting developing nations, and briefly addresses the issues of inhabited wilderness, the need for reorientation of attitudes towards wilderness, and first world responsibility. The submissions which follow are postulated on the premise that the law has a critical regulative and educative role to play in promoting conservation of natural resources in general and wilderness in particular. The pattern of perspectives and propositions presented is as follows:

(1) In their philosophy and programmes, advocates of the wilderness ethic must recognise and accommodate the dilemma confronting the less affluent nations in seeking protection of their natural resources in the face of their immediate and compelling needs for land, food and fuel.

(2) The primary geographical focus is on the sub-continent of southern Africa, as it displays a cultural, economic and political mosaic which is representative, if not a microcosm, of the world community.

(3) Notwithstanding that the notion of group rights is anathema to people who believe in the primacy of the individual, there are sound ecological reasons for extending preferential treatment to certain local communities, even to the extent of expanding the concept of wilderness to include inhabited wilderness.

(4) There is a need for change in value perceptions, a shift from an industrial growth

ethic to a non-materialistic, ecocentric paradigm.

(5) The legislative base for protection of wilderness areas must be expanded. In the post-colonial era of evolving constitutional and political dispensations, an extended concept of human rights which includes environmental quality, and legal entrenchment of conservation bills of rights, should be promoted.

(6) Developed countries have not only the self-interest, but also the responsibility, to render assistance to developing nations in the proclamation and protection of wilderness areas.

THE THIRD WORLD DILEMMA

The protection of wilderness areas poses a dilemma in the third world. There is an apparent conflict between conservation of natural resources and the short term needs of underprivileged peoples. There is massive, widespread rural poverty in many developing countries. People need land to grow food, and burgeoning population pressure compels subsistence farmers to intrude into fragile ecosystems. It is unreasonable to expect a hungry man not to poach, or not to de-bark or cut down a protected tree for medicine if he is sick, or to gather firewood if he is cold. It is irrelevant to his immediate, pressing needs that he may be affecting the interests of future generations, or even his own medium or long term interests. The result of all these pressures is that large areas are in a state of ecological collapse. The sub-continent of southern Africa has a rich heritage of wilderness and wildlife, but in the light of the urgent short term needs of the majority of its population, is it reasonable to seek to preserve this heritage? The answer must surely lie in sustained yield programmes. Wildlife offers a potential source of protein, and Africa has the largest spectrum

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of ungulates in the world, in spite of which the people of Africa still suffer from protein deficiency. The laws relative to hunting and culling programmes should be so designed and implemented as to make up some of this deficiency. The most effective conservation of wildlife is by means of habitat protection, and the surest way of securing habitat is by legal proclamation and protection of wilderness areas. The area of land at present legally set aside as wilderness is small. Even if this land were deproclaimed and made available to feed the hungry, they would only be fed for a very short time and then would be hungry again, in all likelihood having lost those natural resources for all time. It is incumbent on governments as the decision makers and custodians of the public trust, to protect the corpus of that trust, our natural resources. A core element of resource conservation is wilderness protection, and it follows that, as a matter of basic necessity, indeed survival, third world administrators must embrace the concept and philosophy of wilderness. But what is wilderness?

There does not appear to be any generally accepted definition of wilderness. It is a concept which varies from place to place depending upon cultural, geographical and historical circumstances. In developing countries it is often perceived in utilitarian terms, or as land not yet developed or appropriated for man's use, with some variation of attitude depending upon traditional and cultural background. In developed countries, there are also varying perceptions - in planning terms wilderness may be seen simply as occupying a particular niche in the land use continuum, but it also evokes profound aesthetic, emotional, psychological and even spiritual reaction. In Jungian terms, it has been described as reflecting man's inner wilderness. It has even been described as sacred space. It is unlikely that there will ever be universal, complete agreement on a definition of wilderness. Perhaps it is the nature of wilderness that it is neither possible nor desirable that its magic, magnetism and mystery should ever be reduced to precise definition.

A great deal has been written about the utilitarian value of wilderness to man, and it is

generally accepted that it has benefits in terms of spiritual, educational, historical, scientific, aesthetic, and recreational value. In recent years views have emerged that man has an obligation to future generations and should therefore preserve wilderness in the interests of his descendants, and also that wilderness has inherent worth and should be preserved for its own sake and not simply because it has utility for man. It has even been urged that natural objects could and should be granted legal rights. The perceptions of wilderness in the third world are understandably different. Man has a hierarchy of needs, and whilst he is involved in satisfying his lower needs, his awareness of higher levels is inhibited. Because he does not enjoy the affluence and leisure permitting time for relaxed and informed contemplation third world man may not yet appreciate the less tangible benefits of wilderness. However, even in the third world, indeed probably more so than in the first world because of greater dependence on natural resources, wilderness areas require protection for the preservation of species, the maintenance of gene pools for biotic diversity, and as a source of supply of plants and compounds for food and medicine, and for education, tourism, and job opportunities.

The sub-continent of southern Africa comprises the Republic of Southern Africa and several other states with varying degrees of independence or self-government - Transkei, Ciskei, Venda, Bophuthatswans, KwaZulu and others. In this complicated context of political balkanisation, the region presents an admixture of cultures, languages and religions, and a potpourri of ethnicity, which contains both first and third world elements. The region is thus representative of the world community of nations. Because of this mix it is receptive to first world concepts and value perceptions, but must have regard to a wide variety of cultural attitudes and to third world reality and needs. The measure of acceptance and protection of wilderness achieved in this region may well represent a prediction of what is likely to occur on a global scale.

INHABITED WILDERNESS: AN OXYMORON?

In the South African context any notion of group rights which savours of racial differentiation is anathema to those of us who are concerned with the lack of basic human rights amongst large sections of our community. However, there are sound social and ecological reasons for entertaining this notion in clearly defined and restricted circumstances - as has been done in the USA, where it is accepted that Eskimoes and Indians should maintain their traditional rights in respect to marine mammals, migratory birds and eagles, notwithstanding that some of the affected species are endangered and that strict legal constraints on the possession and taking of those species are imposed on other American citizens. Another justification for group differentiation is the adverse impact that Westernisation has had on traditional societies. An example reported in the USA of the social consequences of so-called civilisation being visited upon indigenous people is the Papago tribe of Southwestern Arizona who, over hundreds of years, adapted to desert life, in the same way that the bushmen adapted to life in the Kalahari desert in southern Africa. The lifestyle of the Papago has changed, and they now enjoy modern conveniences such as supermarkets and refrigerators, but they are also susceptible to obesity and diabetes, probably as a direct consequence of their relinquishing their desert-bound traditions, and having given up reliance on desert providence. Having evolved over time so that their bodies and their cultures were capable of tolerating desert cycles, they have now relaxed into a more comfortable state, but with adverse social and health consequences. The aborigines of Australia have similar problems.

The balancing of the subsistence rights of native peoples and conservation of natural resources is not without difficulty. For example, in recent years the bowhead whale controversy in North America raised difficult ethical and legal questions. The continued taking of this species by the Alaskan Eskimoes for subsistence purposes could pose a serious threat to its extinction. Can the survival of a human community whose culture has been

intimately associated with the harvesting of a species be placed above the biological survival of that species? In these circumstances, should any community be exempted from the provisions of the Marine Mammal Protection Act, notwithstanding ancient traditional rights? How should the law balance those traditional rights with the fact that the extinction of the bowhead whale would adversely affect the lifestyle of the Inupiat Eskimo? It is usually not beyond the ingenuity of lawyers to devise saws which will permit sustained harvest in these and similar circumstances, so as to balance the apparently conflicting rights of indigenous communities with conservation of natural resources.

In the third world there is no doubt that wilderness provides immediate as well as long term benefits to local populations. Animal and plant products are a source of food, fuel and building materials. Traditional medicine is made from leaves, roots, barks, bulbs and animal powders. Laws must be devised and conservation practices must be implemented so as to produce recognisable, immediate and tangible benefits to local populations, whilst at the same time inculcating in them an awareness that their continued survival and quality of life are dependent on conservation of their natural resources. They should be involved in wildlife and wilderness protection as part of their regional economy and lifestyle. To this end, controlled taking of flora and fauna must be permissible for indigenous needs. The concept of inhabited wilderness is consistent with the IUCN proposed category of biosphere reserve, anthropological reserve or natural biotic area, which is basically an area in which the native technologies and forest knowledge and utilization, in tropical ecosystems for example, have little adverse impact on natural processes.

One of the few remaining pristine estuarine systems in southern Africa is situated in the northernmost part of the Natal/KwaZulu region, on the border of Mozambique, and is known as Kosi Bay. It is not in fact a bay, but four interconnected lakes, each of which possesses different ecological characteristics. The Kosi system has no counterpart anywhere in southern Africa. Notwithstanding the burgeoning population of KwaZulu, exacerbated by the

shortage of land, the area has tremendous tourist potential which, if properly controlled and managed, will provide a continuing source of income. One of its unique attractions is the stand of raffia palms at Lake Amanzimnyana, which means darker water, and so called because of its peat-stained colour. The palms are spectacular, having leaves of up to ten metres long. The Kosi area can accommodate several wilderness trails, which are becoming more and more popular in South Africa, as in other countries. In fact, the demand for wilderness trails generally cannot be met. In the Kruger National Park, for example, 8 trails are fully booked a year in advance and the percentage of occupancy is just below 100%, which is far higher than the busiest, not popular hotel or holiday resort in South Africa. The Wilderness Leadership School and the Natal Parks Board present statistics of a similar nature.

The KwaZulu Bureau of Natural Resources has announced that the people living on the land surrounding the Kosi Bay nature reserve will benefit by a 25% share of all revenue earned, thus ensuring a better standard of living for the local people in the area. Unfortunately, already 80% of the tribal forest reserves in KwaZulu have been destroyed completely, or damaged so severely that they will never recover, or will only recover with vast injections of money and ecological expertise. However, some major forest areas are still preserved relatively intact and will provide living laboratory facilities and a source of genetic material for any future plans to revive the despoiled indigenous forest areas.

The fish kraals or traps of the Kosi system are an example of the way in which the inhabitants of a natural area as a group may receive preferential treatment by being exempted from the conservation laws applicable to all other persons. The estuary is an important nursery area for a large number and variety of marine fish species. They enter the system to spawn, seeking food and relative safety from predators. The fish kraals are designed in such a way that the fish are not obstructed in their entry into the system. However, on their way back the bigger fish are trapped in the kraals, which are made from local natural materials and

are designed in such a way that the smaller fish may pass through the traps. A kraal is usually handed down from father to son, and the building of new kraals is strictly controlled - permission must be obtained from the family in whose area the proposed site lies, and also from the kraal owners on either side. The local induna or headman must also be consulted. Although the kraals constitute an obstruction to the free passage of fish, they are the traditional fishing method and it has been demonstrated that they represent a form of controlled exploitation which does not have any serious long term effects on the fish populations. As such, they are and should be exempt from any natural conservation laws which would otherwise prohibit such obstruction. They provide an essential source of protein for the local people in an area which lacks arable soils and employment opportunities.

ATTITUDINAL CHANGE

There are sound social and ecological reasons for extending the concept of wilderness to include inhabited wilderness notwithstanding the inherent contradiction in the notion of inhabited wilderness. Conceptual purity must at times bow to practical politics. If wilderness is narrowly defined, then Kosi Bay is not wilderness because it is inhabited. However, the support of indigenous people for the wilderness ethic is more likely to be given and maintained if it is more widely defined so as to permit of varying gradations of accessibility and use. Indigenous societies should not be disrupted, and if local communities are allowed to derive tangible benefits from areas designated as wilderness, albeit inhabited, they will more readily accord value and respect to other categories of wilderness. No two wilderness areas are the same, and the classification, regulation and management of each must recognise that each has its own form and is imbued with its own discrete spirit and essence, its own dignity and worth. A reorientation of attitude and of our conservation laws is required. In some way the traditions, culture and needs of indigenous people must be accommodated in those laws. The cultural heritage of the black in Africa includes unique wilderness values. Unless something of this

heritage is captured in our thinking in respect to wilderness; unless we eschew all semblance of paternalism or transplanted philosophy, there is the danger that wilderness may be perceived as a neo-colonial white man's luxury. In their deliberations, planners must recognise and accommodate third world needs and priorities. Pragmatism dictates that the benefits of wilderness protection must be immediate and demonstrable. Where man has in effect become a component of a particular natural area, in the sense that he is part of a natural balance and does not indulge in extensive cultivation or other substantial modification of his environment, his continued presence is compatible with natural resource conservation and should be legally protected.

An unfortunate hangover from colonialism and apartheid is a perception that laws relating to hunting and the protection of wildlife reflect economic privilege or class interest, and that wilderness and game sanctuaries are the playground of an elite group. Wilderness will not survive in Africa unless in some way there is woven into the fabric of the concept of wilderness the tradition, culture and spirit of the African. The Roman Law legal notion that a wild animal is *res nullius*, belonging to no one in its wild state, and thus capable of ownership by anyone who captures or kills it, is no longer tenable. Even in the context of third world needs there should be recognition that wilderness and wildlife are deserving of man's utmost care and stewardship, not only because they have utilitarian value, but because they are repositories of inherent worth. Indeed, man has become so supreme as the dominating species on earth that he should think of himself as having obligations only, and not rights, vis-a-vis non-human species. In any event, the urban economic growth ethos of the first world. Having regard to the changing social patterns in developing countries, the ever increasing population pressures on the land, and the escalating trend towards urbanisation, continued adherence to the urban industrial paradigm can only be sustained at the ever increasing cost of losing essential natural resources and amenities. A shift from homocentric to biocentric or ecocentric value orientation should be encouraged in third world countries, so that they

do not continue to seek to attain the unattainable technological advancement of the first world. Westernisation has disrupted traditional cultures and values. The time has come for a new dispensation. Africa needs to look to its own roots in formulating concepts, laws and policies for the protection of its few remaining wild places.

EXTENSION OF THE LEGISLATIVE BASE

It has been debated whether wildernesses should be accorded rights, and it is tempting for the lawyer committed to the wilderness ethic to argue that they should have standing to sue in injunction and damages proceedings in their own right, through an appointed curator. Unfortunately, at least in the immediate future, the idea of assigning rights to non-human entities is unlikely to meet with general approval, and law does require a substantial degree of general support to be effective. However, the law can play an educative and advocacy role in this context. Even if wilderness is regarded merely as a utility or resource, it is clearly a resource which is limited, and it urgently requires protection.

The role of law in providing that protection must not be underestimated. Obviously the ideal and most effective solution to the problem of conservation of our finite and fragile natural resources would be wide public acceptance of conservation norms, and an increasingly informed and sensitive public, together with a change in our economic and political paradigms. But the changing of attitudes and the evolution of a new ethos will take time, and time is of the essence. Man has impacted so severely and detrimentally on his environment that he can no longer afford the luxury of evolutionary change. The law cannot produce a magic wand to wave away our environmental ills. But properly and expeditiously formulated and implemented, it can substantially assist in alleviating them.

Wilderness enjoys a large measure of statutory protection in South Africa but, in comparison with the position in the USA 264 wilderness areas were designated by 1983,

encompassing over 32 million hectares. At that time only eight wilderness areas had been set aside in South Africa covering a total area of only 244,500 hectares. The position has not improved much since then insofar as legally declared wilderness areas are concerned. Part of the problem is that, unlike the USA where the public domain includes vast tracts of land, approximately 80% of all land in South Africa is privately owned, and wilderness areas may at present only be proclaimed on state land designated as state forests. There is a clear need for legal provision for declaration of wilderness on other public lands, on private land with appropriate inducement or compensation, and in inhabited areas.

For comparative purposes, relative to perception of value and de jure protection, it is instructive to note that in the USA there has been a specific Wilderness Act since 1964. Wilderness first achieved legislative recognition in South Africa in 1971, when the 1968 Forest Act was amended to enable formal proclamation of wilderness areas. A new Forest Act was promulgated in 1984, which provides that no land set aside as a wilderness area may be withdrawn except with the approval of the House of Assembly (now to be construed as the Houses of Parliament under our new tricameral system of government), which is indicative of official recognition of the value of wilderness. South Africa does not as yet have a separate and specific Wilderness Act, and there does not appear to be much prospect for promulgation of such a statute in the foreseeable future. As far as de facto protection is concerned, "institutional" wilderness began in the USA with the setting aside in 1924 of its first wilderness area in New Mexico. There is no comparable history of concern and administrative protection of wilderness in southern Africa. Certain areas in South Africa, for example in the Kruger National Park, have in fact enjoyed a degree of protection as wilderness as a matter of administrative policy. But policies can and do change, as do administrations, particularly in the third world context, and it is imperative that protection of wilderness be legally entrenched to ensure continuity of protection to the fullest extent possible.

In recent years there has emerged an extended concept of human rights which includes the right of every individual to environmental quality. A Draft Bill on Environment Conservation was published in the South African Government Gazette on 29 May 1987 which provides, inter alia, for the determination of a national policy in respect of "the establishment and maintenance of living environments which contribute to a high quality of life for the inhabitants of the Republic of South Africa."

One of the principles within the framework of which that policy is required to be formulated is that "Every inhabitant of the Republic of South Africa is entitled to live, work and relax in a safe, productive, healthy and aesthetically and culturally acceptable environment."

Another is that "The preservation of productive systems and unimpeded natural processes is essential for the meaningful survival of all life on earth."

These are commendable expressions of official concern for the environmental quality of life of all the inhabitants of South Africa, but they remain at the level of policy declaration. They are merely hortatory statements and do not have the effect of substantive law.

Internationally, there is a growing acceptance that the entitlement of every person to equality of opportunity should include the right to a decent environment, and that any infringement of this right should be declared by society to be unlawful. This right is so basic that it should be constitutionally entrenched wherever possible, as has been done in several states in the USA. It is in this context that wilderness should be viewed. It should not be considered in isolation, but in an overall, social and ecological context. Wilderness advocacy may sound hollow and irrelevant if one has regard to southern Africa's crises in political rights, education, medical facilities, housing, employment opportunities and other societal needs. However, no issue is more compelling, more deserving of our attention than the condition of our environment and the status of

our natural resources, of which wilderness is the benchmark.

In the light of predictions of shortage of fuel-wood, hundreds of thousands of species on earth being irretrievably lost as their habitats vanish, the disappearance of about 40% of the remaining forest cover in lesser developed areas, and southern Africa becoming as tree bare as the Middle East within two generations, urgent new initiatives are required. The traditional, slow, ponderous, evolutionary process of attitudinal change, with regulatory controls following laboriously as laws respond to meet society's perceived needs from time to time, is no longer adequate. The world community should encourage the entrenchment of the basic human right to a decent environment at the highest possible legal level at every opportunity. In the third world context of emerging nations and new political dispensations, these opportunities do exist, and such enactments may well prove to be the most effective legal tool yet devised for wilderness protection.

A CONCLUSION: FIRST WORLD RESPONSIBILITY

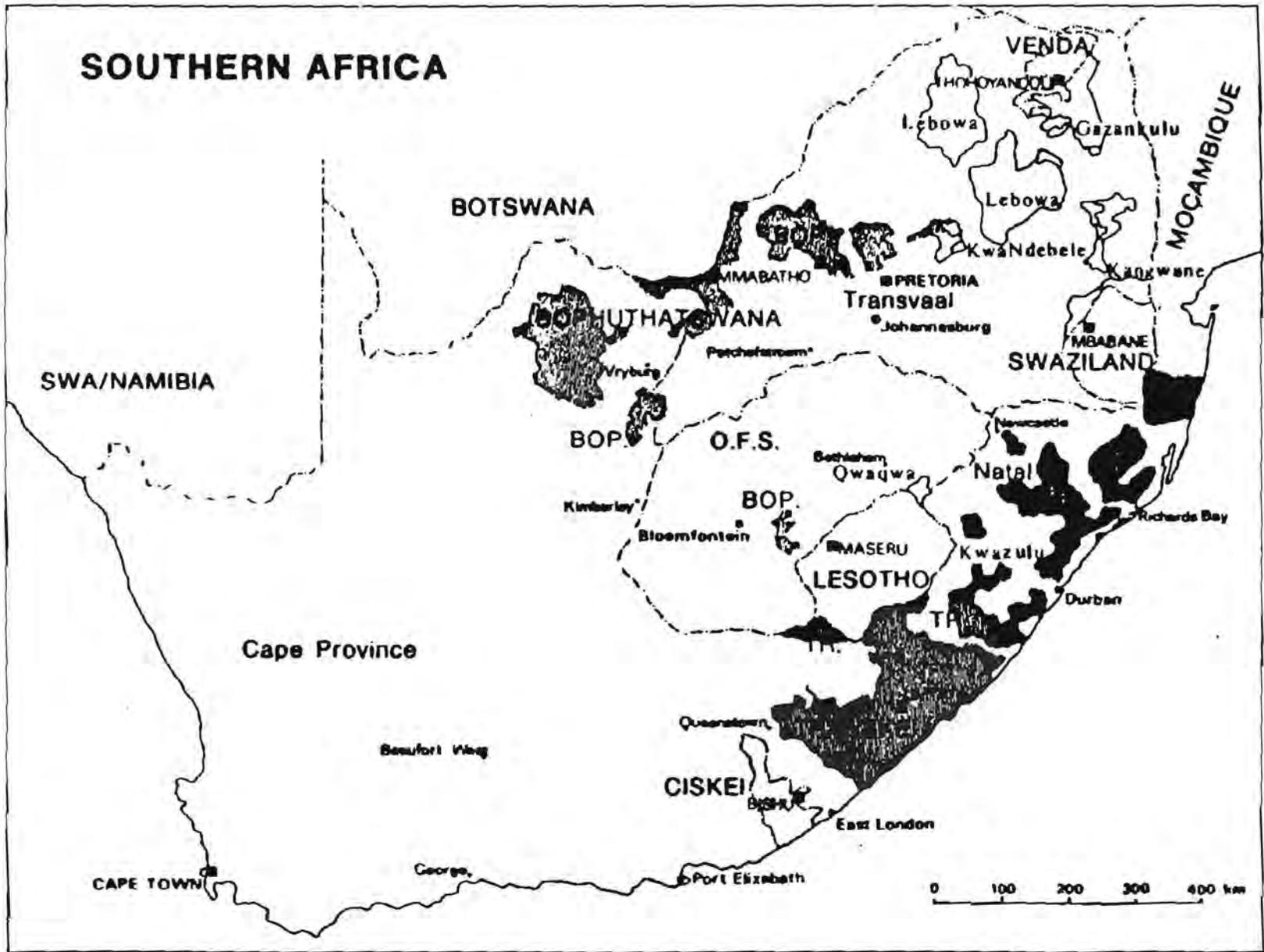
The extinction of the black rhinoceros in the sub-continent of southern Africa would not just be our loss, it would be mankind's loss. The removal of tree cover in one country affects the climate of other countries. There is a oneness and interdependence about the web of life that transcends all issues and differences. It is in the interest of all that the threads of that web be protected wherever threatened. In a very real sense the security of the first world depends upon its stewardship of the world's resources. Some third world countries may have neither the means nor the expertise to cope with the legitimate, processing needs of their burgeoning populations and, at the same time to ensure conservation of their natural resources, including wilderness. As a matter of self-interest, if not responsibility, developed nations should promote and encourage the formulation

of international treaties, laws, policies and programmes to assist developing nations in the setting aside and protection of wilderness areas. By so doing, they will contribute greatly towards achieving mankind's hope and goal of an harmonious future in a decent world environment.

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NATURE TOURISM AS AN ALTERNATIVE ECONOMIC OPPORTUNITY FOR WILDLANDS MANAGEMENT AND RURAL DEVELOPMENT: MARKETING, PROMOTION, AND ENTERPRISE DEVELOPMENT*

C. DENISE INGRAM PATRICK B. DURST

Specialty travel is one of the fastest growing segments of today's international tourism industry (Alpine 1986; Dameyer 1986; Ingram and Durst 1987b). Beaches, amusement parks, and other traditional vacation destinations continue to attract steady crowds, but a growing number of travelers now seek less conventional travel alternatives.

Nature travel to exotic destinations is a major part of this specialty travel. Increasingly, the quest for new experiences is leading Americans, Europeans, and Japanese to developing countries. The growing demand for specialty travel in developing countries presents numerous opportunities for increased rural economic development and conservation management.

WHAT IS NATURE TOURISM?

How is nature tourism different from eco-tourism or science tourism? All of these terms describe related nature activities sought by international tourists. Activities range from common family excursions such as hiking, fishing, camping, and wildlife viewing to strenuous outings such as trekking, whitewater rafting, or spelunking and to educational and scientific expeditions such as orchid study and geological research.

The preceding examples also represent a classification of activities into the two dimensions of "hard" or "soft", relative to physical rigor and level of interest by the participants (Laarman and Durst 1987). Some tourists have a casual interest in nature activities as a part of their overall vacation package. This "soft" dimension contrasts with "hard" nature tourists

such as botanists, ornithologists, and other researchers who have a "dedicated" educational and scientific interest in the flora and fauna of an area.

Laarman and Durst present another "hard-soft" distinction relative to the physical rigor of the activity. "Hard" nature tourism activities may include long, vigorous hiking or trekking expeditions and rugged accommodations such as campsites or lodges. Examples of "soft" activities may include day hikes or excursions with comfortable, modern accommodations. The "hard" or "soft" dimension for level of interest may sometimes be combined with the opposite dimension for physical rigor and vice versa.

FPEI NATURE TOURISM RESEARCH

For the past two years, researchers with the Forestry Private Enterprise Initiative (FPEI) have conducted studies of the potential for nature tourism to advance the economic development of rural areas, while serving to protect the resources needed to sustain such tourism. FPEI research has examined two broad segments of the tourism industry: 1) research and development and 2) marketing and promotion.

Field studies by Durst (1986a and 1986b), Laarman (1986), and Wilson (1987a and 1987b) identify research and development needs for nature tourism in selected developing countries. Studies conducted in the Philippines, Thailand, Costa Rica, and Ecuador address common tourism development issues: identification of nature tourism destinations, images, and attractions; rationale for images, and attractions; rationale for promoting nature-oriented tourism; structure of supplier firms; growth opportunities and constraints of nature-oriented tourism; existing infrastructure and facilities; park personnel and management; tour guides; organizational problems; available statistics and data bases; marketing and promotion; and relations between public and private firms.

*in Krump, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

Many countries will require increased coordination of traditional rural development activities with tourism programs that maintain and manage national parks, biosphere reserves, and conservation areas. Although a tremendous amount of research has focused on tourism, and tourism data are abundant for some countries, information on the possible interactions of nature tourism and rural development in developing countries is generally lacking. Ingram and Durst's (1987a) annotated bibliography addresses the marketing and promotion of nature-oriented tourism activities for wildlands management and rural development.

Successful marketing strategies depend on several factors. Reliable and timely data on consumers, market trends, and industry development provide the basis for sound management decisions. A major task for most promoters of nature tourism in developing countries is to make potential visitors aware of the products that exist. A review of the promotional efforts of developing country tourism offices indicates a wide range in the quality of promotional materials and the efficiency of their distribution (Durst and Ingram 1987). Improvements in the promotional activities and materials of developing countries would help many countries enhance their images and entice additional international tourists to visit.

U.S.-based tour operators specializing in nature tourism frequently conduct tours in tropical developing countries (Ingram and Durst 1987b). A wide variety of outdoor and natural history activities are offered in Africa, Asia, and Latin America. However, the majority of nature tourism is concentrated in a few countries such as Kenya, Nepal, and Costa Rica. Many other countries have the wildlands resources capable of attracting foreign visitors, but so far have failed to promote their attractions adequately enough to compete with established nature tourism destination. Improvements in country image and increased promotion of these attractions will offer the nature tourist even more variety in destinations and experiences. Likewise, host countries need to convince travel agents and tour operators that quality attractions are accessible in their countries, that support facilities are readily

available, and that operating constraints can be minimized.

A study of former students and faculty of the Organization for Tropical Studies (OTS) by Laarman and Perdue (1987) illustrates the substantial impact science tourism can have on a developing country. Annual direct spending in Costa Rica attributable to OTS alone is estimated at approximately \$1.5 million, which is about 1.3 percent of the country's total tourist income. Almost 60 percent of OTS participants make return trips to Costa Rica and 69 percent claim to have influenced other persons to travel there.

The preceding studies by FPEI are only a sample of the kinds of research needed to adequately assess the potential for rural development through nature and science tourism in developing countries. Undoubtedly, further work is required in the specific countries and regions involved. Nevertheless, present studies and information show that the growing demand for nature-related tourism presents opportunities for developing countries to realize conservation objectives while providing economic benefits to rural communities. Successful development of a nature tourism industry clearly depends on strong cooperation between public land managers and private sector entrepreneurs. A multisector approach can help balance the needs for natural resource protection, increasing demands on land resources by rural populations, and opportunities for local economic growth.

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GAME-FOREST CONFLICTS IN TANZANIA'S PROTECTED AREAS*

H. G. SCHABEL S. L. S. MAGANGA

ABSTRACT

Almost half of Tanzania's territory is still forested to some extent and the country retains some of the world's outstanding wildlife paradises. Both of these resources are vital for this rural subsistence economy. Forests account for about 91% of the country's total energy consumption alone and wildlife could be a major source of foreign income.

The growth rate of Tanzania's human population is among the highest in the world, however, and pressures on natural resources are increasingly being felt. The present rate of forest depletion is estimated to exceed sustainable harvest levels by a factor of two. Meanwhile, forest game continues to concentrate in these diminishing forests with potential consequences for certain species of trees.

This paper examines the nature and extent of game-forest conflicts in Tanzania's protected areas, as well as efforts to prevent or contain forest damage there. Emphasis is on the special problems inherent in large game such as elephant.

INTRODUCTION

In the minds of many people, Tanzania conjures up names like Ngorongoro, Serengeti, Kilimanjaro, Manyara, Ruaha, Tarangire and the Selous, evoking images of primordial African landscapes filled with game.

This country is indeed still blessed with extraordinary forest, wildlife and landscape

resources. No other territory of comparable size hosts a fauna of such diversity and abundance. Swynnerton and Hayman (1950/51) list 289 mammal species, including 47 species of large herbivores with 37 species alone of antelope and their relatives. Also, no other African country has committed more land to protected status. Fully 26.1% of Tanzania, a country the size of Texas and Colorado combined, is presently classified as national park, conservation area, game reserve or game controlled area. About 46% of the country is still wooded to some extent, 14% of this in forest/woodland reserves (FAO 1981).

As more than 75% of the country's total population is crowded on about 15% of the land, Tanzania retains vast expanses of wilderness with little or no human habitation. This country, however, has one of the world's highest growth rates. If unabated, the present population of 23.5 million will double in a matter of 20 years and reach 88.9 million by 2025 (Anonymous 1987).

Population pressures of this magnitude will undoubtedly heavily impact natural resources, and strains are indeed already being felt. Forests and woodlands in the rural periphery have been decreasing or deteriorating at alarming rates to meet the growing population's hunger for land and energy (FAO 1981). Woody fuels account for about 91% of the country's energy needs and present cutting rates exceed sustainable harvest levels by a factor of two. As forests recede, so does forest game, especially the larger herbivores. For several decades now these have been observed to congregate in the relative safety of protected areas (Lamprey *et al.* 1980).

Whether such concentrations of game have had an impact on the forests and woodlands of the country's protected areas and what has traditionally been done to reconcile game and forest conflicts, is the focus of this paper, based

*in Krumpal, E.E. and P.D. Weingart, eds. 1992. Management of Park and Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

on a partial literature review and on personal observations and impressions.

CLOSED FORESTS

As Tanzania's closed forests and woodlands represent two distinctly different vegetation types, they will be treated separately.

The closed forests of concern to us here, tend to be well-watered, evergreen to semi-evergreen types of the montane or lowland variety. Covering less than 1% of Tanzania's territory, many have been declared water catchment forests since German times, but have lately also been gaining recognition as bioreserves for their enormous biological diversity and endemism (Rodgers and Homewood 1982). Production forestry is largely restricted to plantations of fast-growing soft- and hardwoods on the periphery of natural closed forests. Characteristically, most mountain forests adjoin very dense human habitation and continue to be subject to serious encroachment.

Many game species found in the closed forests are true forest dwellers. During British times, when various plantations of exotic and indigenous trees were established, duikers and bushbuck (browsing damage), bushpig (uprooting seedlings) and monkeys (ringbarking) regularly had to be controlled (Gilchrist 1962). With the exception of Syke's monkeys, which still cause significant damage in pole-sized and mature softwood plantations at Meru and Sao Hill (Fig. 1), concern with these small animals seems minimal at this time.

Other game species such as rhinoceros, buffalo and elephant are less specific to closed forest habitats, but have traditionally also had at least seasonal strongholds in some of the northern mountain forests. Animals of this size in large numbers not surprisingly can affect forests in significant ways. Gilchrist (1962) credits them with having been responsible for the creation and maintenance of grassy glades and park-like openings in formerly closed forest. From a wildlife and landscape point of view, these openings may certainly be desirable, but they have also been implicated in destructive

forest fires which can easily start in grassy and herbaceous flash fuels.

While Gilchrist (1962) categorically stated that "trees and other vegetation in catchment forests of the Northern Province are definitely suffering from the attention of elephants", it is not possible to reiterate that statement and a similar assessment by Afolayan (1975) with the same assurance now. Some elephant damage can still be observed in the mountain forests and neighboring plantations at Meru and Kilimanjaro, but it cannot be called serious. It is very likely that in the intervening years the number of mountain elephants has decreased significantly due to elimination and emigration. The black rhinoceros, formerly an occasional browser and trampler of forest regeneration (Gilchrist 1962), has already completely vanished from its former mountain strongholds in the North.

WOODLANDS

Unlike the relatively small islands of closed forest, hemmed in by dense human populations, dry-land forests still cover vast tracts of Western, Central and Southeastern Tanzania. They encompass a wide range of vegetation from savanna woodlands of the miombo type to the drier woodland savannas composed mainly of species of *Acacia* and the baobab *Adansonia digitata*. These woodlands are characterized by seasonal droughts, low human populations and, where infested by tsetse flies, an absence of livestock.

Both miombo and acacia woodlands contain prime wildlife habitat, frequented, at least seasonally, by many species and often large numbers of forest game. Among them are elephant and many obligate and facultative browsers (Hofmann and Stewart 1972), including giraffe, sable and roan antelope, eland, greater and lesser kudu, gerenuk, Lichtenstein's hartebeest, impala and dikdik. The majority of Tanzania's national parks and major game reserves are composed of such woodlands. Miombo forest reserves of the production type are also important for their bee industry and as a source of lumber and woody fuels. Several



woodland reserves overlap with game reserves to some extent.

During the peak of the dry season, woodland game tends to congregate near water. It is at such times and in such places, that the pollarding effect accomplished by many of the browsing antelopes and by giraffe is quite conspicuous. Natural checks on these animals still appear to be quite effective, however, and the browse production rate of many woody species usually manages to outpace consumption rates (Vesey-Fitzgerald 1973; Lamprey *et al.* 1980).

Unlike giraffe and the antelopes, elephants, by virtue of their size, destructive power and longevity, can impact woodlands dramatically. By browsing, branch and stem breakage, bending, uprooting, bark and wood damage, elephants can act as major agents of ecological change. For them, natural checks also tend to be less effective and often operate with a lag, i.e. when vegetation damage may already be very serious.

As a result of habitat loss and harassment, elephant in particular have been observed to concentrate in protected areas of Tanzania and other African countries since the late fifties. Prior to 1955, for instance, no elephants whatsoever were to be found in the Serengeti National Park, as opposed to 2,000 there only twelve years later (Lamprey *et al.* 1967). At Lake Manyara, population densities as high as 6.3 elephant per square kilometer were reported in the late sixties and many other protected areas concurrently experienced crowding.

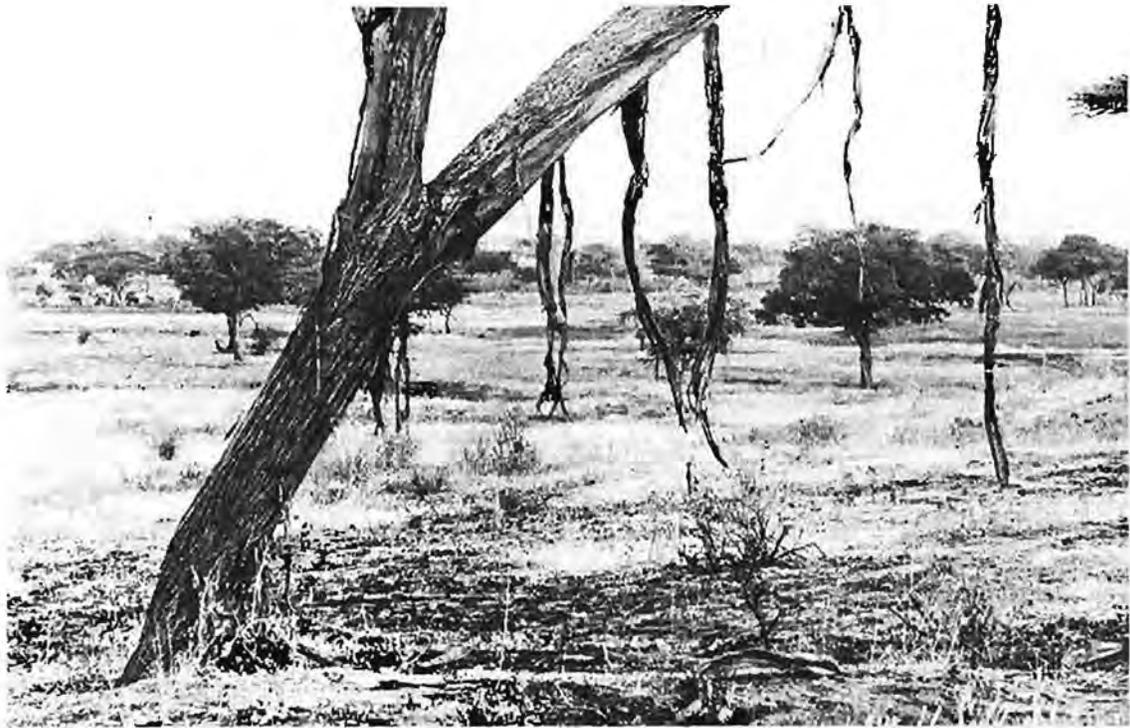
Among the many tree species affected by elephant in Tanzania (Lamprey *et al.* 1980), *Acacia tortilis* and *Acacia xanthophloea* have received the bulk of attention. They were the subject of lengthy studies at Lake Manyara (Douglas-Hamilton 1972; Douglas-Hamilton *et al.* 1978; Kalemera 1983) and Serengeti National Parks (Lamprey *et al.* 1967; Croze 1974; Herlocker 1976 and Pellew 1979). The emerging picture was one where elephants by killing mature trees, initiated successions from forest/woodlands to brush or grassland, a

conversion aided by complex interactions with giraffe and other browsers, as well as drought and fire (Fig. 2).

In reviewing previous data on the Serengeti acacia woodlands, Pellew (1979) confirmed previous estimates of mortality in mature *A.xanthophloea* and *A.tortilis* at about 6% per year. Assuming unchanged elephant numbers in the park, he predicted all existing mature trees of these species to be lost within 15 years or less due to elephant, while a combination of giraffe and fire may retard or prevent regeneration of the acacias.

Projections of this nature do of course hold uncertainties, as Manyara has demonstrated. Predictions there for the future of *A.tortilis*, a character tree of this park, were similar to those for the Serengeti woodlands, when between 1967-70 the elephant population at Manyara experienced a growth rate of 5.3% annually (Douglas-Hamilton *et al.* 1978). A series of dry years (1970-76) followed, however, during which the elephant growth rate declined to 2.2% per year. During these dry years, elephant-related mortality in mature *A.tortilis* also slowed down. Finally, in 1977/78, disease caused a 16.2% drop in the park's elephant population. Concurrent good rains during this period facilitated a remarkable recovery in the vegetation including acacia.

Another characteristic tree in the parks and reserves is Africa's often gigantic "upside down" tree, the baobab, each a veritable ecological island and source of many benefits and uses (Wickens 1982). Big enough to resist human destruction, these veterans frequently remain untouched by shifting cultivators, charcoalers and fires. As a result, they are still abundant on suitable sites outside protected areas, although they tend to show very little if any regeneration there. However, in certain areas of national parks, such as at Tarangire and Ruaha, baobab may be threatened by elephant, who will not allow any regeneration while mutilating and destroying even mature specimens (Fig. 3) of these pachyderms of the plant kingdom. Wound closure in baobabs is normally quite effective, but repeated or communal attacks by elephant may result in the trees being



completely hollowed out, torn up and literally pulped (Fig. 4). An assessment of the present status of baobab in the parks, has apparently only taken place in Ruaha (Barnes 1980).

PREVENTION AND CONTROL OF GAME DAMAGE

Tree protection against game in East Africa, as summarized by Gilchrist (1962) and Hesmer (1965), traditionally included barrier techniques (fences, moats or repellents), population control (hunting and driving) and silvicultural approaches (planting of striplings and of species of lower susceptibility). The focus of these efforts was usually production forestry of high management intensity.

In contemporary Tanzania, most of the techniques mentioned may not be applicable for technical or cost reasons but also perhaps because big game populations in some crucial forest plantation areas are not as numerous as in decades past.

One particular crop protection scheme, though presently practiced along the southern border of Arusha National Park where agricultural land directly adjoins wildlife habitat, warrants attention. This relies on live fences composed of virtually impenetrable Mauritius thorn (*Caesalpinia decapitata*) which are claimed to be effective even against larger game species (Kitya, pers. communic.). This approach deserves to be experimented with in a forestry context, together with other types of "botanical" fences (e.g. *Dracaena*, bamboo, *Eucalyptus* and *Euphorbia tirucalli*), which have long been planted for livestock control in various areas of Tanzania. Their use against smaller forest game as well as livestock may be of interest at a time, when the country embarks on various agroforestry and village afforestation schemes. In German times quite promising trials with agroforestry had to be abolished partly because of animal problems.

The present level of ringbarking by Syke's monkeys in plantations of exotic softwoods, would normally be considered



serious enough to call for controls. However, as long as softwood manufacturing capacity is lagging behind the allowable cut from softwood plantations, as is presently the case in Tanzania, any expensive monkey control program would probably not be economically justified.

The protection of trees in Tanzania's parks from elephant, is quite a different matter. Consistent with present park philosophy, elephant impact on vegetation has generally been allowed to take its course. In a few instances, key specimens such as certain "lion trees" in Manyara or certain baobabs near park campgrounds, have been individually protected with wiremesh. Otherwise, legal (in cropping zones neighboring the parks) and illegal hunting as well as environmental factors such as drought, starvation and disease, as experienced on a large scale in neighboring Kenya (Tsavo) in the early sixties and seventies, or on a smaller scale at Manyara since, have effected a degree of control. Beyond that, the prospect of losing acacias and baobab in certain park areas was real.

In the meantime, however, the concern is shifting from the former victims to the former culprits, i.e. from acacias to elephants. Recent figures (Stephenson 1987) indicate that Tanzania's famous Selous Game Reserve alone may have lost half of its former elephant population of 100,000 to poachers in a matter of five years (1981-86) and it is only reasonable to assume similar declines in other parks and reserves.

CONCLUSION

Overall, it is obvious that game/forest conflicts in Tanzania continue to occur temporarily and locally. Such problems are, however, minor compared to the much more serious depletion of both forests and game by direct or indirect human interference.

Tanzania cannot afford to lose either of these resources. According to Yeager and Miller (1986), ecological stresses resulting from overpopulation, dubious villagization schemes and continued low agricultural productivity, have already reached crisis levels in several

particularly vulnerable regions of Tanzania, and increasingly jeopardize the future of neighboring protected areas. The present decline in forest resources and elephant populations is symptomatic of this trend. Fewer elephant will of course mean fewer elephant problems for trees in the protected areas, but the loss of unique animal resources such as the rhinoceros and elephant, will rob Tanzania of economic options. Only by alleviating food and energy deficiencies through economic and technical innovations in agriculture and forestry and by mobilizing tourism as a major source of foreign income can the spiral of increasing human population and declining subsistence possibly be reversed.

Integrated rural development schemes such as presently under consideration for the Selous Game Reserve and its rural neighborhoods (Stephenson 1987), may provide new opportunities to settle urgent land use issues. These may include decisions, as to where and in what numbers animals such as elephant can be sustained compatibly with other resources and what the mechanisms should be to achieve harmony. Only then can wildlife, rather than being a source of "problems", become a sustainable source of "pride, profit and protein" for the people of this country. Without its magnificent wildlife, Tanzania would not be Tanzania.

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TOURISM AND CONSERVATION IN KENYA'S NATIONAL PARKS: PLANNING FOR A BETTER PARTNERSHIP*

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Like a modern Midas, it (tourism) has transformed much of the world's natural beauty into pure gold. In the process, the industry may have planted the seeds of its own destruction. For the suspicion is growing, ever so slowly, that the more tourism succeeds, the more it cannibalizes the very basis of its own existence—the wilderness, the unspoiled landscapes, the quaint villages, the unique cultures that drew visitors in the first place (Crittendon, 1975).

BACKGROUND

There is a growing apprehension that tourism clashes with more traditional conservation objectives for national parks and game reserves in Kenya. Concern over the impacts of visitors on habitat, wildlife behavior, and the amenity value in Kenya parks has been voiced by a variety of sources (Jewell, 1974; Lamprey, 1972; Myers, 1972; and Olindo, 1972). Grounds for concern are provided by the not uncommon sight of lions, leopards, or cheetahs surrounded or pursued by tourist vehicles, a spectacle serving only to reinforce the notion that congestion is unduly destructive. Given the importance of tourism in the Kenyan economy, the capacity of the parks to support and maintain tourism is of special concern.

"How many visitors is too many?" is a question confronting park managers around the world, one which results from the similarity in

value systems among park visitors. Too many visitors attempting to share the same unique park experience may easily destroy the environmental qualities and values that attract them to East Africa's parks. This dilemma is of special concern to Kenya because a decline in the appeal of parks also foreshadows declining revenues. Ultimately both the resource, and the industry built on it, are threatened. Kenya's welfare, in both an ecological and an economic sense, can benefit when a better balance between conservation and use is achieved.

Much of the negative impact of commercial tourism stems from a laissez-faire approach to planning and managing national parks (Western and Henry, 1979). Many parks around the world, which have been developed implicitly to increase use and revenues, do not have an adequate framework to evaluate the costs and benefits for various levels of use and impact. But in Kenya where an economic objective for parks is explicitly stated, planners have begun to develop more direct methods of calculating optimal use levels at some of the more heavily used parks and reserves (Western, 1975; Western and Thresher, 1973).

Research reported in this paper, conducted in Kenya between 1973-1976, provides an assessment of visitor preferences, behavior, and environmental impacts for Amboseli National Park. It identifies some important factors affecting the visitor capacity, and points out mitigating measures that can promote the development of a better long-term partnership between tourism and conservation.

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Amboseli and Tourism

Tourism is big business in Kenya, both in terms of employment and foreign exchange. The widespread eradication of wildlife, especially during the Second World War, spurred establishment and development of national parks and game reserves, although the tourist industry did not flourish until the 1960's. Kenyan Independence spurred further conservation measures in anticipation of earning foreign exchange. The introduction of charter flights from Europe in 1967-68 (Pollack, 1974) helped to make this a reality.

With the exception of a period during the oil crisis of 1973, tourism has been a stable or increasing factor in the Kenyan economy since that time. In the last three years the annual rate of increase has been 25 percent, reaching more than 550,000 foreign visitors in 1986, a figure consistent with the government's target of one million by 1990. Amboseli, a small 150 square mile park on Kenya's southern boundary with Tanzania, contains wildlife and scenic resources highly valued by local and international tourism and travel industries. Its diversity of readily photographed wildlife, set against the magnificent backdrop of Kilimanjaro, combined with excellent accommodations and accessibility make Amboseli one of the most heavily used wildlife areas in the country.

Concern over the potential impact of tourism led to the first capacity planning exercise for any East African park. The approach taken in Amboseli is described in the following section.

Calculating Visitor Capacities

Visitor capacity for a park is not an absolute value, but one which will vary with the level and type of research, planning, investment and management provided. Theoretically, capacity is gauged at the point of marginal returns. In practice it is not desirable to evaluate it this way since the resource may be irreparably damaged by the time capacity is reached. It is better to estimate capacity on the basis of acceptable environmental impacts and

the effect of different use levels on amenity value and visitor perception.

The estimate of capacity is made in three steps. First, the potential capacity of the area under optimum management conditions is calculated using a number of indices of resource capability. Some of the important factors that govern the attraction and potential capacity of a park include its size, tractability, fragility, landscape, vegetation cover, the number and variety of species of animals, their distribution in space and time, and unique attractions. For Kenya parks and reserves, this has been reduced to four conceptual categories--diversity, uniqueness, concealment, and resilience--described in depth elsewhere (Western and Henry, 1979; Western, 1975). It is generally recognized that the greater the physical and biological diversity of an area, the greater will be its attraction and visitor capacity for a given level of impact (Lloyd and Fisher, 1972). A park may be visited for its unique or rare attractions, the availability of which will limit capacity. The capacity of the area to conceal use and reduce interpersonal visibility, and the susceptibility of the area to degradation with use will also impose major restraints on visitor capacity.

Second, the pattern of visitor use and its elasticity is examined. Visitor viewing choice severely constrains capacity if the preferred amenity is scarce and/or fragile. The more selective and specific the visitors' preferences and behavior are, the greater will be the congestion around these key attractions, and the lower the capacity.

It is important, therefore, to look at visitor behavior and its impacts. By doing so it may be possible to alleviate one pressure point after another until a constraint is met that is unsurmountable--based on finance, visitor behavior, or managerial skills. At this point, the capacity of the park has been reached. Impact assessment is an essential part of the evaluation. Certainly, the number and nature of contacts among visitors and in relation to specific attractions, a measure of congestion and impact used in temperate parks (Brown, et al, 1976), is useful in savannah parks. The

flexibility in visitor behavior in response to interpretive services will determine how far such congestion can be alleviated.

Finally, the costs and benefits of various types and levels of development and management are examined. It is essential to identify management techniques that mitigate visitor impact and protect resources. An analysis of the costs and benefits of different types of management are needed to guide management decisions. Capacity estimates developed in this manner should be recognized as a basic planning tool, not a rigid guide. Since the willingness of visitors to pay to enter a park will decline as a saturation threshold is approached, the point of maximum profitability may be reached before social capacity. Consequently, careful monitoring and management will be needed to reach an optimal balance among income, impact and numbers. This paper, while reviewing all three components of capacity estimation, concentrates on visitor behavior and its impact on Amboseli Park.

VISITOR BEHAVIOR AND IMPACT ASSESSMENT

The primary recreational use of Kenyan parks by foreign visitors is wildlife viewing and photography. With the exception of a few parks where walking safaris are possible or where few dangerous animals exist, all transport and movement in the parks is vehicular. The typical safari lasts 2-3 weeks with itineraries that take visitors through a series of parks and reserves in which they spend 1-2 days each. Visitors travel in chauffeured minibuses or land-rovers, less frequently in self-drive rentals or privately owned vehicles, and occasionally in large vehicles such as small buses or lorries which have been outfitted for safari.

A variety of observational techniques and survey methods were used to measure visitor behavior and preferences, assess impacts and measure viewing flexibility. The patterns of vehicle use and visitor preferences were identified by sampling behavior. Point observations were made from Observation Hill

where 90+ percent of park could be observed. Game viewing drives were sampled by following a number of safari vehicles. Impact assessment was focused on predators and visitor interactions. Visitor viewing preference and its flexibility were explored by experimentally broadening the interpretive service given to selected visitors.

Preferences and Expectations

A small cross-section of park visitors was surveyed to look at the expectations they had on arrival in Amboseli, the amenities that they found to be satisfying, how they would like to apportion their viewing time among the amenities, how they perceived park problems, and their reaction to vehicular congestion.

Expectations (Table 1) were limited and general in nature. Kilimanjaro was really the only expectation specific to Amboseli. Others could apply equally to most parks in East Africa. The extent to which different amenities actually contributed to satisfaction is shown in Table 2 (Henry, 1979).

Seeing and photographing wildlife in its natural habitat were the most important elements. However, rare and endangered animals and unusual wildlife behavior also contributed significantly to their satisfaction.

The social experience is also valued. Visitors expressed enjoyment in meeting new people, exploring different cultures, and learning from knowledgeable guides. Facilities, services, and a relaxing atmosphere are essential, but secondary.

A variety of ecological, management, and visitor use problems bothered the majority of visitors, though not necessarily based on actual knowledge of the situation in Amboseli. Visitors were quite bothered by "habitat destruction and drought", "too few animals in the park", and the "dusty condition of the park", especially during the dryer months or after visiting less arid parks. Maasai cattle in the park was only perceived as a problem by repeat visitors, a small proportion of users.

Table 1. Specific Visitor Expectations for Amboseli

| EXPECTATIONS | RESPONDENTS (%) |
|---------------------------------|-----------------|
| Natural Scenery and Wildlife | 33 |
| Being able to see Kilimanjaro | 11 |
| Being able to see Predators | 10 |
| Good Photographic Opportunities | 8 |
| Miscellaneous and Other | 9 |
| No Specific Expectations | 29 |

Table 2. Sources of Visitor Satisfaction.

| Rank | Type of Satisfaction | Dimensions of Scale | Mean |
|------|----------------------------------------|------------------------------------------------------------------------------------------------------------|------|
| 1 | Wildlife in its natural habitat | Seeing wildlife in its natural habitat Seeing a wide variety of animals, natural scenery and landscapes | 4.4 |
| 2 | Unusual or rare wildlife attractions | Seeing rare or endangered animals Seeing unusual wildlife behavior and interactions | 4.0 |
| 3 | Photography of wildlife | Getting good wildlife photographs Getting close-up photographs of wildlife | 3.7 |
| 4 | Exposure to other peoples and cultures | Knowledgeable and conversant guides Exposure to other peoples and cultures | 3.6 |
| 5 | Interpretive information | Information on ecology and animal behavior; information on local people | 3.4 |
| 6 | Facilities and Services | Good service/friendly staff Comfortable Lodge/Good Food Good Visitor Facilities | 3.0 |
| 7 | Relaxing atmosphere | Quiet, peaceful surroundings Sunshine, rest, and relaxation | 2.8 |

In terms of management related problems, visitors appeared to be most bothered by a "lack of information on the park and its wildlife" and "drivers and guides who seem uninformed and uncommunicative". Non-English speaking visitors, previous visitors to Amboseli, members of conservation organizations, and those visiting during the rainy season were all bothered by these perceived problems. Relatively few visitors were worried about the condition of access roads or the tracks in the park, unless they visited Amboseli during the rainy seasons.

Most visitors were bothered to some degree by "overuse and damage resulting from unregulated tourist vehicles" and by "crowding—too many vehicles in the park". Members of conservation organizations and repeat visitors were most likely to express this concern.

Vehicular congestion was explored in several other ways in the survey. Based on the hypothesis that congestion is primarily a problem around the predators, visitors were asked to answer a series of questions about when it bothered them. "Seeing many cars and people around the lodges" did not bother most visitors. "Seeing many cars out in the park while game viewing" did, while "seeing many cars in the park, but only at a distance" did not. "Seeing few (5-10) vehicles in the park, but having them in close proximity" bothered most visitors. "Seeing many cars while stopped to view lion and cheetah" bothered them even more.

Visitors indicated that their enjoyment of lions and cheetahs decreased with increasing density of tourist vehicles. On average, they would tolerate an average of 3.2 vehicles around the lions or cheetahs before their viewing enjoyment was adversely affected. Their tolerance could be increased to an average of 4.5 vehicles, if drivers and passengers were more careful and considerate of the big cats and each other.

Observational Research

Despite existing price differentials, there is a definite seasonality in visitor use. The highest use occurs in the dryer months of

August through October and January through March when wildlife is concentrated in Amboseli. It may also reflect other factors such as good weather and dry roads in the southern hemisphere, winter in the northern hemisphere and school holiday periods. During the study period, entries were about a third less in wet season months. Visitation by Kenya residents (25% of total) indicated a preference for weekends.

The daily activity of tourists in the park was a function of time of arrival, length of stay, meal times, and the best times of day for viewing and photographing the wildlife. The typical length of stay was 1.2 days with most visitors coming at mid-day and departing the next day after breakfast. A second distinct group would come later in the afternoon and either depart the next day after lunch or spend the whole of the next day and depart the following morning. The arrivals and departures led to a distinct bimodal pattern of use with a morning peak between 6:30 and 11:00 a.m., and an afternoon peak between 3:30 and 6:30 p.m.

On a game viewing drive visitors averaged 32.5 km in 103 minutes during which they stopped to view or photograph animals and scenery only 22 percent of the time. Visitors generally took at least two drives during a typical stay in Amboseli. Between 1 and 5 km were driven cross-country.

The spatial distribution of use is highly restricted. Ninety percent of all vehicle use was observed in only 10 percent of the area. Use was further concentrated along a few major roads and along the swamp edges. It is possible that 90 percent of vehicle use is concentrated in as little as 5 percent of the park's surface area.

Statistically, the concentration was not directly related to the overall distribution of wildlife in the park in either wet or dry seasons. Although use did shift away from the swamp areas in the wetter seasons, it was largely unrelated to overall wildlife distributions. However, visitor distributions do relate to predator sightings. Visitors stopped only for 24 of 55 mammals, a few of the 400 species of

birds, and a few scenic attractions including Kilimanjaro and Observation Hill. Seven attractions—lion, cheetah, elephant, rhino, buffalo, hippo, and giraffe—accounted for 70 percent of all viewing time, and over 80 percent when Observation Hill is added (See Appendix 1). Lions if added alone accounted for one quarter of visitors' time. There is a definite inverse relationship between visitor interest and animal size and scarcity.

As with the spatial distribution of use, viewing is more selective than is immediately apparent. Although there are few groups of lions, cheetahs, elephants or rhinos compared to other species, only a portion of these are readily found by visitors on any given day. Prime attractions with territories or ranges near the center of the park are subjected to a disproportionately greater amount of tourist traffic. It is these habituated attractions in the center of the park that govern visitor viewing patterns.

A communications network among the drivers, although undocumented, also contributes to the congestion. When two vehicles pass, a greeting is almost always followed by the question, "Where are the lions?" or "Have you seen any cheetahs today?"

Impact Assessments

Predator-Vehicle Interactions. Research in Nairobi National Park indicated lions altered their hunting behavior because of vehicle pressure (Rudnai, 1970). Are Amboseli cheetahs, diurnal hunters most active during early morning and late afternoons also affected? Grounds for concern certainly exist. Western (1973) noted that in the 1960's he saw as many as 10 cheetahs a day in Amboseli. During this study, only six were seen, and then only sporadically.

Direct evidence of a social impact from congestion around the lions and cheetahs was not found. Although the average number of vehicles visible to any tourist party throughout a typical drive was less than one, the average number of vehicles seen around the big cats was

over seven. Yet the length of stay was not noticeably affected, even when concentrations exceeded 20 in number. However, vehicle arrival rates and lengths of stay strongly suggest the existence of queueing, especially on busy afternoons. Both photography and wildlife viewing are much more difficult when vehicles are highly concentrated around the predators.

The data do show that cheetah behavior, in contrast with visitor behavior, was adversely affected by congestion (Henry, 1980). Cheetahs were observed to walk and search for prey, or approach/stalk prey only when an average of less than one vehicle was present. Cheetahs were more likely to try to get away or escape from 5 or more vehicles. Harassment, in the form of engine revving, whistling, shouting, or throwing things at the cheetah, occurred frequently and the cheetahs responded by trying to avoid those vehicles or by lying down to outwait them.

Another factor, not measured, which may affect the degree of impact is the distance between predators and vehicles. The majority of visitors do not use cameras with telephoto lenses, and their preferred distance was 20 feet or less in those situations where the terrain would permit it. At this range, 4-5 vehicles, by encircling the predators inhibit photographers and animals alike. The constant maneuvering and jostling among vehicles further stresses animals and frustrates visitors.

Off-Road Vehicle Driving. Lack of a well defined road system, combined with flat topography and open terrain did nothing to discourage off-road driving during the study period. The damage to grasslands, though minor and localized, affected visitor impressions of the park. Western (1984) found that the measurable impact on the major habitats was extremely small, destroying less than 1 percent of the annual grass production is likely to be destroyed. For up to ten vehicle passes there is a complete recovery during the first rains. More passes take progressively longer to recover. Deeply rutted tracks may take a decade or more. The indirect effect of dust-fall from vehicles was also found to be insignificant both in terms of reducing vegetation production and

its consumption by herbivores. None the less, visitors perceive off-road driving as an ecological threat and an eyesore.

Effects of Interpretation

To gauge the elasticity in visitor viewing and the effect of management intervention, a small sample of tourist parties was accompanied by a guide who attempted to influence the viewing pattern. Ecological, behavioral, and cultural information was volunteered whenever opportunities presented themselves, but no attempt was made to influence the behavior of visitors other than through the provision of information.

The experiment had several interesting results (See Appendix 1). Visitors were so interested in the information they received that the average length of the drive increased 15-20 minutes. Since they also spent less time driving (20 minutes), their overall stationary viewing time increased by an average of 40 minutes. Most significantly, the provision of information did have the effect of making visitors less selective in their viewing patterns (Henry, 1979). The more information available, the easier it is to change visitor viewing patterns. Although some animals remain inherently more interesting than others, information greatly diversifies viewing.

CONCLUSIONS

Absent further investments in development and management, the existing pattern of use constitutes a major constraint on Amboseli's capacity to accommodate increased tourist use, without causing further ecological or visitor impacts. From conservation and tourism viewpoints, it is evident that the desirable capacity level was being exceeded under the management regime that existed at the time of the study. However, the elasticity in visitor viewing suggests that a better long-range partnership between conservation and tourism can be achieved by alleviating the pressure points around prime attractions, especially lion, cheetah, elephant, and rhino.

From an ecological perspective, the impact of visitor use on cheetahs is the most obvious

and serious management problem. Cheetah may be displaced as a result of heavy tourism. Better management intervention can do much to help protect cheetah and improve visitor appreciation of this endangered species.

Visitor perception of crowding and overuse is indicative that congestion has reached a worrying level. Experiencing seven or more vehicles while watching lion or cheetah, when 4-5 is considered a more desirable level is troubling. The outcome for tourism of letting this situation deteriorate further is difficult to predict. It may discourage tourists from visiting Amboseli or Kenya, displacing them to other parks and other countries. But the species is likely to have suffered irreparable harm before that happens. A conservative management strategy argues for some cost-effective management intervention as soon as possible. Congestion is clearly not in the best interest of either visitors or animals.

Dust raised by vehicles also has a direct and appreciable effect on visitors by reducing the quality of the viewing experience and photographic opportunities. Vehicle tracks across the open grasslands, and the innumerable dust contrails clearly related to vehicle activity, further detract from the natural experience visitors seek. In the absence of an ecological constraint, the capacity of the park may depend more upon visitors' tolerance of both the numbers and the activities of others. What is significant about the existing impact of vehicles is that it is highly conspicuous and perceived as a problem by visitors themselves. Since reduction in the amenity value of the park will affect visitor capacity, planning and management must focus on reducing the visual impact of viewing activity.

Many viewing tracks have been built since the study period. The solution now rests more with managing visitor use itself. At the present time, tour drivers and guides unwittingly contribute to the problem. The primary function of drivers and rangers is and has been to take visitors directly to the most attractive features—lions, cheetahs, rhinos and elephants. For their services they are given tips. Tipping compounds the problem. There is an urgent

need to look at visitor management and interpretation. At the present time, drivers and guides are seldom trained in either skill. For most there is little or no training available, and few information sources exist on park ecology, wildlife behavior, bird/plant/tree identification, geology, history, or the cultural context of parks.

The communication network between drivers and rangers contributes to congestion and attendant problems by letting drivers quickly find out where key attractions have most recently been seen. Despite what visitors believe, only a small portion of their wildlife viewing is left to chance. Tour companies and drivers are, to some degree, setting up a standard against which the visitor measures the success of his or her safari. Predators are that standard. Drivers are rewarded accordingly. It is easy, lucrative, and destructive. Better and less destructive standards need to be set.

The elasticity in visitor viewing demand and its responsiveness to interpretive services suggests that management can mitigate congestion, help conserve wildlife and raise tourist revenues. Research points towards some available solutions.

First, the road developments which have been funded through the World Bank Tourism and Wildlife Development Project need to be monitored and evaluated to see if they have had desired effects on congestion, visibility and dust.

Second, attention must be given to regulatory measures to deal with specific management problems, such as the impact on cheetah. Setting approach distances for vehicles may be part of the solution. Measures need to be taken to limit the numbers of vehicles around the predators at any given time and to prevent them fully encircling the animals. These may include time and route scheduling, licensing tour drivers, and imposing penalties on drivers who harass animals. The feasibility and desirability of total or partial elimination of off-road driving also needs to be evaluated.

Since the lack of information is particularly problematic, special attention should be given to training. Industry and government need to train and inform drivers. The curriculum at the new ranger training school in Naivasha needs to include a major emphasis on visitor management and interpretation. It is always more desirable to influence visitor behavior through subtle management than harsh regulations. Research makes it clear that there are clear opportunities for doing so. Visitor viewing is malleable, and visitors welcome more information and the chance to understand more about wildlife behavior. The goal should be to establish a new ethic and set of norms about how Kenyan wildlife resources are treated. When it can be argued that the gross annual worth of each of the lions in Amboseli is over \$27,000 or that the worth of an elephant herd is worth \$610,000 per year (based on visitor viewing times and expenditures), the argument becomes more convincing to developing countries such as Kenya where the alternatives for wildlife are often death by poaching or elimination of their habitat from farming.

It is difficult to justify biotic reserves in a land starved country to subsistence agriculturalists or pastoralists when they need land and never visit parks. Under such circumstances where tourism can support conservation there is no reason not to set economic objectives for parks and plan accordingly. Sustained profitability requires balance in use and preservation, the same objective as for conservation. Capacity planning can promote that balance which is a partnership that can only benefit national parks.

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APPENDIX 1

| Viewing Attraction | Population Size | Visitor Viewing Times (min) | Interpretive Test Viewing Times (Min) | Survey Preference Viewing Times (Min) |
|--------------------|-----------------|-----------------------------|---------------------------------------|---------------------------------------|
| | | | (Standardized) | |
| Lion | 40 | 10. | 9.8 (5.7) | 6.6 |
| Cheetah | 8 | 8.6 | 9.6 (5.5) | 4.7 |
| Elephant | 400 | 4.0 | 10.0 (5.8) | 5.4 |
| Giraffe | 280 | 2.9 | 3.2 (1.6) | .9 |
| Buffalo | 450 | 2.6 | 5.0 (2.9) | 2.6 |
| Rhino | 10 | 2.4 | 4.8 (2.8) | 4.7 |
| Zebra | 3,800 | 2.2 | 5.0 (2.9) | 2.6 |
| Impala | 1000 | 2.1 | 4.0 (2.3) | 2.3 |
| Birds | --- | 1.8 | 7.0 (4.0) | 3.1 |
| Hippo | 100 | 1.5 | 5.5 (3.2) | 2.5 |
| Gnu | 4,500 | 1.3 | 2.8 (1.6) | 2.2 |
| Gazelle | 3,000 | 1.3 | 1.3 (1.9) | 2.4 |
| Observation Hill | 1 | 14.6 | 30.0 (17.3) | --- |
| All Other | --- | 1.1 | 3.7 (2.1) | 6.8 |
| | | 57.0 | 103.7 (60.0) | 60.0 |

WILDERNESS USERS: PATTERNS, CHARACTERISTICS AND PREFERENCES

MOUNT ST. HELENS—A CASE STUDY OF CHANGING DEMANDS FOR WILDERNESS-LIKE MOUNTAIN PEAKS

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PATTERNS AND CHARACTERISTICS OF LARGE GROUPS USE IN THE HIGH PEAKS WILDERNESS AREA

Anderson B. Young, State University of New York College at Cortland

Carol DiGregoria, University of North Carolina

WITHOUT WORDS: USING PICTURES TO MEASURE SOCIAL CONTACT PREFERENCES IN A WILDERNESS AREA

Steven D. Moore, University of Arizona

Stanley K. Brickler, University of Arizona

CANOES, COMPUTERS, AND COOPERATION IN MINNESOTA'S BOUNDARY WATERS CANOE AREA WILDERNESS

Barbara A. Soderberg, USDA Forest Service

MOUNT ST. HELENS—A CASE STUDY OF CHANGING DEMANDS FOR WILDERNESS-LIKE MOUNTAIN PEAKS*

ALAN EWERT FRANCISCO VALENZUELA III

ABSTRACT

In its recent history, Mount St. Helens has undergone a unique transformation, necessitating the demand for a new look at how the area should be managed. This paper discusses an on-going study which describes the demographic characteristics, motivations for climbing and preferred management techniques of the mountain-climbing visitor. Preliminary results indicate that the climbing visitor is middle-age, usually male and generally climbs in small groups of friends or relatives. Seeing the volcano and getting some physical exercise are the most often cited reasons for climbing at Mount St. Helens. Management techniques that are least restrictive yet preserving of the natural environment were the most often selected.

In its recent history, Mount St. Helens was considered a beautiful, serene mountain wilderness, abundant with wildlife and outdoor recreation opportunities such as mountaineering. On May 18, 1980 that serenity was shattered by a cataclysmic volcanic eruption which not only created the worst volcanic disaster in the United States, but also created a situation that has challenged the way remote wilderness-like land areas are managed. The recent volcanic activity necessitated the creation of the Mount St. Helens National Volcanic Monument (PL 97-243, 1982) to protect the unique features of the mountain for interpretation, recreation and research. Included in this law was the mandate to identify and implement management plans for visitors to the Monument. It is expected that a

significant portion of those visitors are interested in climbing Mount St. Helens and viewing the crater from the rim. The purpose of this study is to identify the demographic characteristics, motivations for climbing, and the preferred management actions desired by this group of outdoor recreationists. This paper will outline the methodology and preliminary findings of this study.

METHODS

In accordance with management planning, as advocated by Driver and Brown (1984), management actions should be consistent with the environmental, social, and administrative goals of an agency. The Mount St. Helens National Volcanic Monument utilizes the Recreation Opportunity Spectrum (USDA 1982) framework and the Limits of Acceptable Change (Stankey et al. 1985). These provide the underlying conceptual basis for the management decision process. The ROS system manages the physical, social and managerial attributes of the recreation setting to provide opportunities for specific recreation experiences. The Mount St. Helens National Volcanic Monument utilizes six ROS classifications ranging from Primitive to Urban experiences. The Mount St. Helens National Volcanic Monument Final Environmental Impact Statement, Comprehensive Management Plan (CMP) established the ROS objectives and the social encounter standards for each ROS classification.

Mount St. Helens is being managed to provide Primitive and Semi-Primitive recreation opportunities. The CMP states that visitors should have a high probability of 0-6 encounters with other groups per day in a

*in Krumpal, E.E., & P.D. Weingart, eds. 1992. *Management of Park & Wilderness Reserves*. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

primitive setting. In a semi-primitive, non-motorized setting, 6-15 encounters is to be expected. In order to maintain these standards or setting indicators (as well as other ecological and safety concerns) visitor use was limited to a target of 100 climbers per day.

The CMP required that a monitoring of the number of climbers and overall climbing experience take place and that the level of use be adjusted to provide an appropriate level of use for a quality recreation experience that still provides an acceptable level of protection for ecological processes. In order to monitor the impact of these new restrictions on the climbing experience a four-step evaluation process was developed. These steps included: (1) collecting public input concerning the proposed management plans primarily from mountaineering clubs and concerned individuals, (2) initial design of the climbing regulations to be implemented, (3) a monitoring of that system and (4) a modification of the system to better meet the goals of management and desires of the public.

This study will be used by the Forest service to help define what a quality recreation experience is on Mount St. Helens and determine what the appropriate level of use should be. This study may result in a modification in the way some of the recreation setting attributes will be managed.

In order to identify the demographic characteristics, motivations for climbing at Mount St. Helens, and the preferred management actions, climbers at the monument were queried using a questionnaire and on-site interviewing. The questionnaire was designed after receiving input from the climbing community, the Forest Service and previous similar research.

RESULTS

After a number of public discussions, mostly attended by representatives of local climbing clubs, initial findings included the following:

* The climbing public is not particularly interested in opportunities for solitude or concerned about crowding at Mount St. Helens.

* The climbing public generally feels that primitive and semi-primitive designation (using ROS standards) of Mount St. Helens is too restrictive for their activity.

* The motivations for climbing the mountain were related to getting to the top and seeing the crater rather than traditional wilderness-based motives such as personal challenge or preservation.

Subsequent to this preliminary data collection, a revised questionnaire was distributed to the registered climbers between May 15 and August 15. While the data collection phase of this study is not complete, an initial sample of 50 respondents was randomly selected from an available pool of 84 climbers. The results of this preliminary data analysis are listed in the Appendix.

With respect to the demographic characteristics of mountain climbers at Mount St. Helens most were a part of a small group of friends or relatives. Most respondents rated themselves as being either moderately or very experienced climbers with an average number of 10 years of climbing experience. However, a standard deviation of 7.3 suggests that there is a wide range of experience within this classification and the data support this view with a range of scores of 0 years of experience to 23 years. Similar to previous studies on backcountry users (Hendee, Stankey and Lucas, 1978) the mean age of the climbers was 35 years and the predominant gender was male.

People reported climbing Mount St. Helens for a variety of reasons. Chief among these reasons was the desire to see the volcano and observe the natural setting. Of less importance were the motives of experiencing adventure, reaching the summit and the development of climbing skills. These findings are in contrast to earlier studies that suggested adventure-seeking and skill development were more important reasons for mountaineering than

observing the natural environment (Ewert 1985). Given the unique and relatively unprecedented nature of Mount St. Helens as an active but accessible volcano, the present data seem justified.

Within this analysis, a number of items were related to the management of Mount St. Helens. Items which were reported to have the most detrimental effect on the climbing visitor's experience were airplane/helicopter sounds, people on the crater rim and evidence of human waste. Moreover, it should be noted that this preliminary sample included those individuals that had climbed Mount St. Helens early in the season; a time when climbing visitor use had not reached its maximum. These findings suggest even more detrimental effects on a climbing visitor's experience as the season progresses.

Respondents were also asked to rate their perception of "crowding" on the mountain. While crowding was perceived as moderate, the participants reported a substantial difference between the number of people they encountered and the number of people they would have preferred to encounter. This fact, coupled with a rating of 4.5 (on a scale of 1 to 5, with 5 being very satisfied) for level of satisfaction regarding the overall climbing experience, supports the view of Manning (1986) that crowding and density of users have different impacts on the satisfaction of an outdoor recreational experience. It appears that while the density is greater than optimal, the mountain is perceived as only moderately crowded and most climbers reported a very satisfying climbing experience. It should be noted, however, that Shelby and Heberlein (1986) report that a satisfaction index is not generally a completely useful management tool in determining what the appropriate level of use should be as the concept is too broad and indistinct.

When queried about the permit system used to regulate the number of climbers, a large majority of participants (92%) indicated that it was a reasonable method for controlling use. In addition, most respondents (70%) said that the limit was too high and 11% indicated that it was too low. Once again, it should be noted that

many of these climbers visited the monument early in the year and may have missed the high level of competition for the available permits.

Regarding the collection of a fee, the respondents were about evenly split with 56% in favor of a fee as part of the permit system and 44% opposed to it. Of those in favor of a fee system, the most appropriate amount indicated was between three and four dollars per climb.

With few exceptions, the majority of respondents were more supportive of less intrusive management techniques such as, education rather than backcountry rangers; call-in reservations rather than first-come, first-serve; and limited facility development. It would appear that the climbers preferred a management environment that was the least restrictive to their climbing activity. This finding supports the concept of a "focused activity" whereby the user is interested in going to an area specifically to engage in an activity or to achieve a particular goal. In this case, the goal appears to be to reach the rim and enjoy the volcanic scenery. This concept of "focused activity" is somewhat antithetical to the traditional idea of wilderness as strictly a place for reflection and contemplation (Nash 1973).

DISCUSSION

Concomitant with forming a more accurate demographic picture of the climbing population at Mount St. Helens is the larger picture of managing and regulating the climbing opportunities. While it would appear that the climbing public does not want a substantial development in the climbing areas, there does seem to be strong interest in other forms of facilitation of the climbing experience. Moreover, given the unique natural setting and relative ease in climbing Mount St. Helens, there also appears to be an overwhelming interest in seeing the volcano.

There is some indication that, in general, climbers desire a type of management suggestive of semi-primitive ROS classification. While climbers typically encountered about 30 groups of other climbers they preferred to encounter approximately 9 other groups. This is similar to

the semi-primitive guidelines of 6-15 encounters with other groups. The preliminary results of this study suggest that the primitive classification, at least with respect to the number of social encounters (0-5 encounters), may be too stringent for the climbing public. This finding further supports the concept of "focused activity" since, unless extreme, the number of climbing groups encountered does not usually interfere with reaching the summit. Restricting access, however, to keep within a 0-6 encounter guideline can definitely hinder goal attainment by making the overall climbing trip more difficult, longer or impossible.

This poses an interesting situation for the Forest Service as the climbing public clearly does not desire a wilderness designation with its attendant rules and regulations for the climbing areas of the monument. Just as assuredly, it appears that opening the monument for an unlimited number of climbers is also an undesirable management option in the eyes of the climbing public. At this point in the study, it remains unclear as to whether the limit of 100 climbers per day is an appropriate balance between these two options.

MANAGEMENT IMPLICATIONS

Major mountain peaks represent a limited natural and recreational resource. Although these areas are controlled by different management agencies, agency directives usually focus on protecting the resource while providing reasonable recreation opportunities. In many situations restrictive management techniques have been met with opposition and a potential decrease in user satisfaction. This may be true in wilderness experience areas where management focusing on the classical wilderness experience with its corresponding emphasis on regulating visitor numbers and activities, may be frustrating specific user groups (e.g. climbers). Consequently, while management guidelines may provide consistency for area managers, techniques such as the ROS used without refinement may be too restrictive and insensitive to certain user groups.

Particularly with respect to accessibility, the initial findings of this project suggest that

people climbing Mount St. Helens may not want the area managed as a wilderness area. This finding supports previous research which also suggested that people engaged in outdoor pursuits, such as mountain-climbing, were more interested in the activity than the pristine nature of the resource (Lee and Brown 1982, Ewert 1985).

The evolution of management at Mount St. Helens will be of great importance to the field of wilderness management knowledge in a unique and relatively "new" area. In addition, various user groups (i.e. mountain-climbers) are becoming more assertive in their demands. Results of this study may influence the management of the other major mountain peaks of the Pacific Northwest, many of which are in designated or de facto wilderness areas. The ongoing process to arrive at an appropriate management strategy provides an excellent case study in the application of contemporary recreation theory. This study will provide insight into how future course wilderness management might proceed.

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APPENDIX

Preliminary Descriptive Data Analysis of Mount St. Helens Climbers Survey

Characteristics of the Climber

| | | |
|--------------------------------------|-----|------|
| With a group of friends or relatives | 72% | (36) |
| Alone | 18% | (09) |
| Part of a climbing/outing club | 04% | (02) |

Climbing experience:

| | |
|------------------------|------|
| beginner = 22% | (11) |
| intermediate = 40% | (20) |
| very experienced = 38% | (19) |

Number of years mountaineering:

mean = 9.9 sd = 7.3

Number of people in group:

mean = 3.79 sd = 2.8

| | | |
|------|--------------------|------------------|
| Age: | mean = 35.02 years | sd = 7.9 |
| Sex: | male = 90% (45) | female = 10% (5) |

Reasons for Climbing Mount St. Helens

(On a Scale of 1 to 5, with 1 = strongly disagree, 5 = strongly agree)

| | <u>Mean</u> | <u>S.D.</u> |
|--------------------------------------|-------------|-------------|
| To observe the natural setting: | 4.6 | 0.8 |
| Experience the volcano: | 4.5 | 1.0 |
| Get some physical exercise: | 4.1 | 1.1 |
| Get away from normal routine: | 3.9 | 1.3 |
| Experience the excitement/adventure: | 3.8 | 1.1 |
| Be with family or friends: | 3.5 | 1.5 |
| Experience the challenge: | 3.3 | 1.4 |
| Reach the summit: | 3.0 | 1.6 |
| Experience the solitude: | 2.7 | 1.5 |
| Develop climbing skills: | 2.4 | 1.4 |

Preliminary Descriptive Data Analysis of Mount St. Helens

Managing Mount St. Helens

Effect following items had on climbing experience:
(On scale of 1 to 5 with 1 = detrimental effect, 5 = beneficial effect)

| | <u>Mean</u> | <u>S.D.</u> |
|------------------------------|-------------|-------------|
| Airplane/helicopter sounds | 2.5 | 1.1 |
| People on crater rim | 2.7 | 1.2 |
| Human waste | 2.9 | 1.3 |
| Encounters with other groups | 3.1 | 1.1 |
| Trampled vegetation | 3.2 | 1.1 |
| Trail erosion | 3.2 | 1.2 |
| Litter | 3.3 | 1.4 |

Future management techniques at Mount St. Helens should include:

Limiting use by: limiting numbers 76% (38); limiting access 10% (5)

Enforce regulations by: education/brochures 54% (27); rangers 18% (9)

Permit system: call-in or reservations 60% (30); first come 14% (7)

Facility development: limited 86% (43); substantial 6% (3)

Was the mountain perceived as crowded. (Scale of 1 to 5, with 1 = "not at all" and 5 = "extremely crowded")

Mean = 3.4 sd = 1.4

Would a user fee be supported? yes 56% (28) no 44% (22)

Amount: mean = \$3.00-\$4.00/per use

Was limiting the number of climbers a reasonable method to regulate use?

yes 92% (46) no 8% (4)

Attitude toward maximum of 100 climbers per day:

Too low 11% (6) About right 70% (34) Too high 20% (10)

The perception of number of people encountered while climbing:

mean = 120 sd = 142.2

The number of people preferred to have been encountered while climbing:

mean = 34 sd = 44.7

PATTERNS AND CHARACTERISTICS OF LARGE GROUPS USE IN THE HIGH PEAKS WILDERNESS AREA*

ANDERSON B. YOUNG CAROL DiGREGORIA

ABSTRACT

Through permits and a follow up survey, data were gathered regarding large group use and groups leaders in the High Peaks Wilderness Area in New York. Overnight groups of 10 or more contributed 28,884 visitor days of use. Temporal and spatial use patterns suggested high probability of encounters with normative size groups. Groups were composed primarily of novice teenagers from camps, schools, and scouting. Leaders were informally trained in outdoor skills, but had high levels of formal general education. They were aware of ecological and social impacts in the High Peaks and favored limits on party size.

PATTERNS AND CHARACTERISTICS OF LARGE GROUP USE IN THE HIGH PEAKS WILDERNESS AREA

Although visitor studies suggest that small private parties of 4 or less are normative in wilderness, interest in the use of wilderness by larger, organized or sponsored groups remains high. For example, Hendee and Roggenbuck (1984) reported that 60% of college courses dealing with wilderness make trips into wilderness. Buell's (1981) survey of outdoor leaders from more varying contexts indicated that most programs (69%) use wilderness settings. Unfortunately, most research on the impact of larger groups suggests that their presence in wilderness is problematic.

Looking at those studies, one finds that large groups (generally defined as having 10 or more persons), have disproportionately adverse

*in Krump, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

effects on both the resource base and the experience of other visitors. Because a large group tends to concentrate use in time and space, its resource impact exceeds that of the same or a greater number of people traveling and camping in the more typical party size of two to four persons (Lime 1972; Hendee, Stankey & Lucas 1978; Cole 1982). Other studies have shown that many wilderness visitors would prefer as many as ten encounters with small parties of two to four persons over a single meeting with a large, organized group (Stankey 1973, 1980; Hendee, Stankey & Lucas 1978). The emerging consensus is that wilderness visitors view large groups as "outside the norm" (Stankey 1973).

Despite these findings, there is no common approach to managing large group use. Approximately half of areas surveyed by Washburne and Cole (1983) had party size limits. Yet the maxima varied from 5 to 60. Such differing approaches to the large group issue may stem from an understanding that large groups usually constitute a small percentage (e.g. 4-10%) of wilderness parties. However, if encounters with large groups are as disturbing as reported (i.e., perceived as non-normative and inappropriate), then one could argue that permitting large groups may be analogous to allowing a small percentage of parties to travel under power. Likewise, group size limits in the teens may be analogous to allowing small, but not large outboards.

Better than analogy, the principles of wilderness dependency (Hendee, Stankey & Lucas 1978, pp. 146-147) serves as an approach to mediating use conflicts. Given conflicting uses, managers would favor the activity that is more in keeping with or dependent upon wilderness conditions. The less wilderness dependent activity would be diminished, discouraged, or, in some cases, prohibited. Applying the principle is easier when managers

can refer the less favored use to a suitable setting in the same vicinity as the wilderness area.

In contemplating large group management measures, managers need not refer only to management-oriented research on large group impacts. A growing number of writers in camping and outdoor education publications are questioning more explicitly the routine use of wilderness, especially for basic skills instruction with novice campers (e.g., Rogers 1979; Boy Scouts of America 1984; Young 1985). These authors cite reasons of safety and instructional design as well as impact while making their cases.

When addressing the questions of large group use in a given area, managers need to understand the degree of large group use and the potential for conflict. In addition, some sense of the purposes of group use and the ideas of their leaders is useful. Knowing their purposes aids in determining the wilderness dependency of their use and, should the step be taken, in referring them to other areas. Knowing the ideas of leaders may facilitate a smoother implementation of policy change.

Problem Statement

This study was conducted to address issues or organized group use in the High Peaks Wilderness Area (HPWA). Managed by the Department of Environmental Conservation (DEC), the High Peaks is the largest (226,435 acres) and most heavily used of New York state's 15 wilderness areas within the 6 million acre Adirondack Park. Researchers and managers wanted first to know the extent and distribution of organized group use. Data regarding the extent of use would determine whether the simple amount of use might be problematical. Data regarding the distribution of group use over time and space would suggest the degree of potential impact on or conflict with more normative visitor patterns. Second, researchers wanted to study the characteristics of large group use, partly to determine the degree to which trip leaders were cognizant of their groups' potential for impact on the resource. Data regarding the character of large group use

might inform decisions regarding regulating or redistributing this type of use.

Methods

Data on the extent and distribution of use were obtained primarily from the 242 overnight camping permits issued in 1982 to leaders of groups with ten or more members. (Smaller parties and large groups not camping overnight are not required to obtain permits.) Data regarding the characteristics of groups and leaders were obtained by a post hoc mail survey of the 193 individual trip leaders. Surveys were returned by 138 of the 170 (76%) leaders for whom permits provided useable addresses. Of the 32 nonrespondents, 24 were Canadian. Incomplete addresses and differing postal return rates may have contributed to the lower response rate (48%) among Canadians. (Translations were sent.)

Results

Findings are grouped under 2 headings—(A) patterns of large groups use and (B) characteristics of large groups and their leaders. The first heading includes the (1) amount and (2) the distribution of use. Under the second heading are subheadings for (1) group characteristics, (2) leader background, and (3) practices and perceptions.

PATTERNS OF LARGE GROUP USE

Amount of use

Table 1 describes the size, duration in nights, and overnight stays of organized groups. Most groups were 12 in size and stayed 2 or 3 nights. The groups constituted an estimated 28,884 visitor days of .13 visitor days per acre. These figures can be meaningfully compared only with .48 mean visitor days per acre for all types of use (e.g., day and overnight, large and small parties) in U.S. Forest Service wilderness management areas (Washburne & Cole 1983). Recognizing that the .13 figure for the High Peaks represents only overnight trips by groups

Table 1. Volume of large group use as function of size and duration of trips.

| <u>Factor</u> | <u>Mean</u> | <u>Median</u> | <u>Mode</u> | <u>SD</u> | <u>Range</u> |
|---------------|-------------|---------------|-------------|-----------|--------------|
| Size | 14.4 | 12.7 | 12.0 | 4.8 | 30 |
| Duration | 4.0 | 3.1 | 2.0 | 3.0 | 15 |

Note: N = 241. Duration measured in nights. Estimated overnight stays: 13,624; estimated visitor days: 28,884 (.13 visitor days per acre).

over 10 in size, one beings to see substantial volume of large group use in HPWA.¹

Distribution of use

Permit data provided useful information about the distribution of use over time and space. As seen in Figure 1, over half the use occurred during July and August. the pattern closely resembled that of general wilderness use in the HPWA and many northern areas (high Peaks Wilderness Advisory Committee, 1977; Lucas 1980). Similarly, groups concentrated their use during weekends. Nearly half (48%) began their trips on a Friday or Saturday. the same percentage concluded their trips on a Sunday or Monday. with temporal patterns of large group use being similar to that of normative use, the potential for small party encounters with large parties seemed high.

Spatial use patterns revealed that large groups tended to use the same routes and campsites as small groups. General use in the HPWA is concentrated along the two easiest routes to Mount Marcy, New York's highest mountain. One is a 7.5 mile approach via Indian Falls; the other a 9 mile trek through the

¹ When measured in visitor days or visitor days per acre, the amount and percentage of use contributed by large groups appears to be much greater than suggested by figures for percentages of parties. When judging the percentage of total use contributed by large groups, party percentages convey the impression that all parties have comparable impact. Using visitor day based figures, large parties may constitute 20% of more of total use. Percentage of parties figures are normally below 10% for large groups.

John's Brook Valley (High Peaks Wilderness Advisory Committee 1977). Fifty eight percent of large groups spent at least one night along the Indian Falls approach; 39% in one of four sites along the John's Brook Valley. During the peak use week (August 2-8) an average of 7.6 large groups were camped along the Indian Falls route each day. In the Valley, the average daily number of large groups was 4.6.

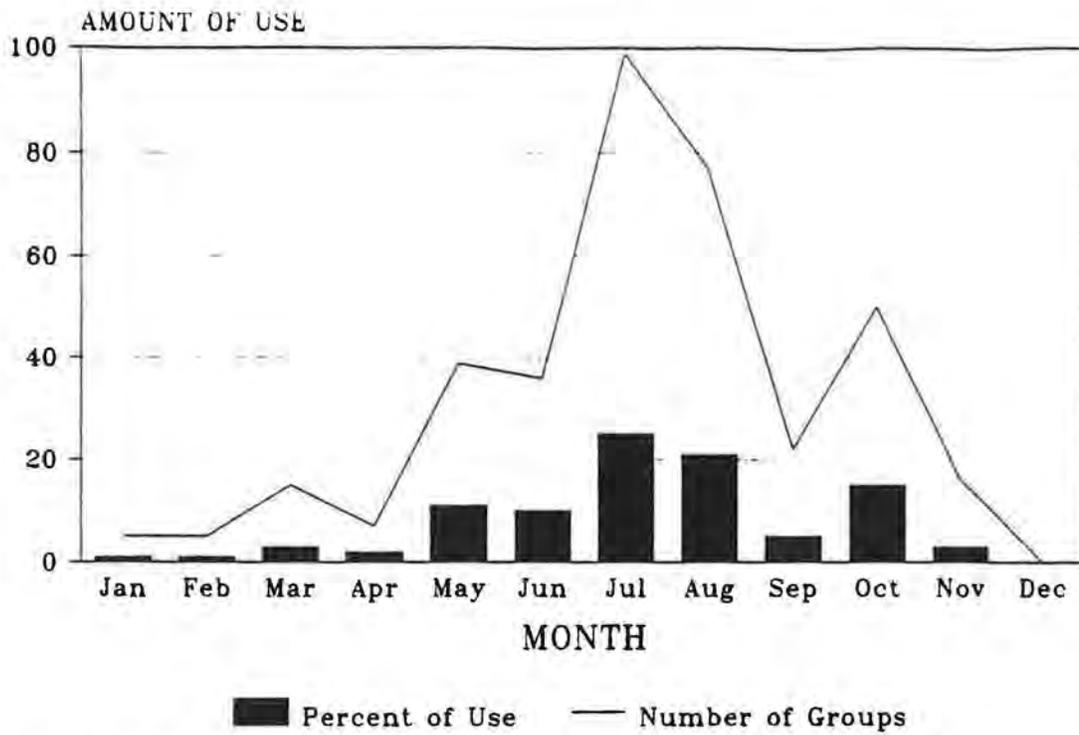
In addition to contributing a large volume of use, large groups tended to travel along the same routes during the same days and weeks of the year as smaller, more normative parties. Therefore, the potential for encounters between large and small parties appears high. This impression was strongly supported by the fact that 66% of large group trip leaders reported encounters with at least one other large group.

CHARACTERISTICS OF LARGE GROUPS AND THEIR LEADERS

Group characteristics

The group characteristics leaders were asked to describe included 1) age, 2) skill level, 3) purpose of trip, and 4) sponsorship. Table 2 shows that clientele were youthful. Nearly 60% were 17 years or younger. Less than 20% were over 21. Not surprising, given their ages, clients were also inexperienced. Fewer than 13% of leaders described their "typical group member" as "skilled" or "expert". Most were novices who were either "unskilled" (27%) or had "some skills" (60%).

Leaders were asked to rank order the purposes of their trips. For each of the purposes listed in Table 3, the percentage of leaders who ranked it among the top three is given. Nearly



half of the leaders cited skills instruction, recreation, or personal development. It is interesting to recall that 87% of leaders described their groups as novice while only 51% ranked skills learning as a major purpose.

Table 4 depicts the sponsorship of large groups both as reported by leaders and as discerned from permit data. As both a percentage of leaders (23%) and a percentage of groups (32%), summer camps were the principal source of group use. Collectively, schools and colleges, summer camps, and scouting accounted for 73% of group use.

Leader Background.

Background characteristics reported include a number of socioeconomic items as well as leaders' responses to questions intended to describe their (a) extent of training (b) extent of experience, and (c) resources used for continuing education.

Over 87% of the leaders were male. As seen on Table 5, 77% had completed four years or more of college. Although they ranged widely in age, nearly half were between the ages of 19 and 30 (Table 6). The median age was 31. An unusually large portion (73.7%) were in professional or technical occupations. Students accounted for 13.1%, and the remainder were business managers (6.6%), craftsmen (4.4%), clerical workers (1.5%) or farm workers

(0.7%). Recalling that these data were for party leaders may help to explain the discrepancies between these findings for education, sex, and occupation and those of general visitor studies (e.g. Lucas 1980).

Leaders were asked to check or write in how they acquired their current outdoor living skills. As shown in Table 7, "self taught (reading, observation)" was the most common response (51%). Leaders also indicated that they learned skills through scouting (31%), friends (29%), or summer camp (24%). Approximately 54% held standard first aid, 28% advanced first aid, and 50% cardiopulmonary resuscitation (CPR). Because so few had pursued formal training or certification, it would be difficult to assess the actual outdoor living and emergency response skills of these leaders.

Leaders appeared to have spent considerable time in backcountry travel. Over 85% had traveled in and 75% had led trips in the High Peaks in preceding years. As seen in Table 8, nearly 80% led more than one trip in 1982. In Table 9, figures for the leaders' longest trip reveal that most had been on trips lasting at least a week (Mean = 15.6; Median = 9.7; SD = 16). Although most leaders had fairly extensive experience, as many as 15% may have been in the HPWA for the first time while leading their trips.

Table 2. Age of large group members.

| <u>Age</u> | <u>Absolute Frequency</u> | <u>Relative Percentage</u> | <u>Cumulative Percentage</u> |
|------------|---------------------------|----------------------------|------------------------------|
| Under 11 | 55 | 3.0 | 3.0 |
| 11-13 | 341 | 18.5 | 21.5 |
| 14-17 | 646 | 35.0 | 56.5 |
| 18-21 | 439 | 23.8 | 80.3 |
| 22-29 | 174 | 9.4 | 89.7 |
| 30-39 | 91 | 4.9 | 94.6 |
| 40-49 | 81 | 4.4 | 99.1 |
| Over 50 | 17 | 0.9 | 100.0 |

Table 3. Primary purposes of trip to HPWA.

| <u>Purpose</u> | <u>Absolute Frequency</u> | <u>Percent of Respondents</u> |
|---------------------------|---------------------------|-------------------------------|
| Environmental Study | 23 | 16.6 |
| Outdoor Living Skills | 70 | 50.7 |
| Outdoor Leadership Skills | 26 | 18.8 |
| Recreation | 66 | 47.8 |
| Personal Development | 68 | 49.2 |
| Youth Development | 49 | 35.5 |
| Therapeutic | 12 | 8.6 |
| Spiritual | 13 | 9.4 |
| Climb a high peak | 33 | 23.9 |

Note: Figures for each purpose represent the number and percentage of leaders who ranked the item as one of the top three purposes of their trip.

Table 4. Sponsor of leader's group.

| <u>Sponsor</u> | <u>Leader Survey (N=136)</u> | | <u>Permit Data (N=177)</u> | |
|------------------------|------------------------------|---------------------------|----------------------------|--------------------------|
| | <u>Number of Leaders</u> | <u>Percent of Leaders</u> | <u>Number of Groups</u> | <u>Percent of Groups</u> |
| Scouting | 22 | 16.2 | 21 | 11.9 |
| College Groups | 21 | 15.4 | 37 | 20.1 |
| Summer Camps | 31 | 22.8 | 56 | 31.6 |
| Publicly Funded Agency | 5 | 3.7 | N/A | N/A |
| Outward Bound Types | 6 | 4.4 | 14 | 7.6 |
| Religious | 12 | 8.8 | 11 | 6.2 |
| Jr/Sr High Groups | 14 | 10.3 | 24 | 13.6 |
| Private Guide Service | 2 | 1.5 | N/A | N/A |
| Outing Club | N/A | N/A | 14 | 7.9 |
| Other | 23 | 16.9 | | |

Note: Because permit data convey percentage of groups while survey data represent percentage of leaders (many leaders led more than one trip), data from both sources are presented. Categories of group sponsorship were not mentioned or discernible on 65 of the 242 group permits. N/A = Not applicable.

Table 5. Highest grade completed.

| <u>Grade</u> | <u>Absolute Frequency</u> | <u>Relative Percentage</u> | <u>Cumulative Percentage</u> |
|--------------|---------------------------|----------------------------|------------------------------|
| 9 | 2 | 1.4 | 1.4 |
| 12 | 5 | 3.6 | 5.0 |
| 13 | 4 | 2.9 | 7.9 |
| 14 | 4 | 2.9 | 10.8 |
| 15 | 17 | 12.3 | 23.2 |
| 16 | 32 | 23.2 | 46.4 |
| 16+ | 74 | 53.6 | 100.0 |

Table 7. How leaders acquired current outdoor skills.

| <u>Method</u> | <u>Absolute Frequency</u> | <u>Percent of Respondents</u> |
|-----------------|-------------------------------|-----------------------------------|
| Self taught | 70 | 50.7 |
| Friends | 40 | 28.9 |
| Scouting | 43 | 31.1 |
| Camp | 33 | 23.9 |
| OB/NOLS/WEA | 16 | 11.5 |
| College program | 15 | 10.8 |
| Family | 14 | 10.1 |
| Clinics | 12 | 8.6 |
| School program | 6 | 4.3 |

Note: OB = Outward Bound; NOLS = National Outdoor Leadership School;
WEA = Wilderness Education Association

Table 8. Number of trips led in 1982.

| <u>N of Trips Led in 1982</u> | <u>Absolute Frequency</u> | <u>Relative Percentage</u> | <u>Cumulative Percentage</u> |
|-----------------------------------|-------------------------------|--------------------------------|----------------------------------|
| 0 | 2 | 1.4 | 1.4 |
| 1 | 28 | 20.3 | 21.7 |
| 3 | 16 | 11.6 | 50.0 |
| 4 | 13 | 9.4 | 59.4 |
| 5 | 13 | 9.4 | 68.8 |
| 6 | 12 | 8.7 | 77.5 |
| 7 | 3 | 2.2 | 79.7 |
| 8 | 3 | 2.2 | 81.9 |
| 9 | 1 | 0.7 | 82.6 |
| 10 | 5 | 3.6 | 86.2 |
| >10 | 19 | 13.6 | 100.0 |

Table 9. Longest trip leader had taken.

| <u>Duration</u> | <u>Absolute Frequency</u> | <u>Relative Percentage</u> | <u>Cumulative Percentage</u> |
|-----------------|-------------------------------|--------------------------------|----------------------------------|
| 0 | 1 | 0.7 | 0.7 |
| 3 | 5 | 3.6 | 4.3 |
| 4 | 5 | 3.6 | 8.0 |
| 5 | 18 | 13.0 | 21.0 |
| 6 | 8 | 5.8 | 26.8 |
| 7 | 16 | 11.6 | 38.4 |
| 8 | 5 | 3.6 | 42.0 |
| 9 | 6 | 4.3 | 46.3 |
| 10 | 17 | 12.3 | 58.6 |
| 11 | 2 | 1.4 | 60.0 |
| 12 | 5 | 3.6 | 63.6 |
| 14 | 11 | 8.0 | 71.6 |
| 15 | 2 | 1.4 | 73.0 |
| 16 | 3 | 2.2 | 75.2 |
| 20 | 2 | 1.4 | 76.6 |
| 21 | 3 | 2.2 | 78.8 |
| 22 | 2 | 1.4 | 80.2 |
| 23 | 2 | 1.4 | 81.6 |
| 25 | 4 | 2.9 | 84.5 |
| 26 | 2 | 1.4 | 85.9 |
| 28 | 1 | 0.7 | 86.6 |
| 30 | 5 | 3.6 | 90.2 |
| >30 | 12 | 9.8 | 100.0 |
| Mean | 15.6 | Standard Dev. | 16.0 |
| Median | 9.7 | Minimum | 0.0 |
| Mode | 5.0 | Maximum | 90.0 |

Note: Duration of trip was measured as number of consecutive nights out on a trip.

did not violate DEC regulations. Their practices did run counter to DEC recommendations and to a growing consensus about impact camping.

TRIP DURATION AND CAMPFIRE FREQUENCY

Based on responses to the 14 item purism scale, leaders were grouped into four categories: Strong Purists (38%); Moderate Purists (51.1%); Neutralists (10.2%); and Nonpurists (0.7%). This distribution was similar to those found in general visitor studied in other areas (Stankey 1973).

Leaders were asked several questions about their perceptions of conditions in the HPWA and their opinions on management issues. As seen in Table 12, over 72% believed the HPWA was used beyond its social-psychological capacity in some (60.9%) or in most (11.6%) places. Even more (81.2%) believed the area was used beyond its biophysical carrying capacity in some (64.5%) or in most (16.7%) places. Overuse prompted just over 25% of the leaders to modify the length or route of their trip.

When asked about limiting the size of groups in the HPWA, 83% favored a ceiling (Table 13). Leaders' approval of size limits was as strong or stronger than found in regular visitor studies (e.g., Roggenbuck, 1980). As seen in Table 14, there was less unanimity about what the limit should be. It is interesting to note that the mode of 12 is the same as the mode for actual group size. Equally noteworthy, 9% of the large group (i.e., >10) leaders favor limits below 10.

Leaders were also asked to check which of the Adirondack Park's other 14 Wilderness Areas and 16 Wild Forest Areas they had visited. Although the exact distributions were too cumbersome to present in this limited space, the impression was clear. Most had been to only one or two other areas. No one area emerged as a favorite.

DISCUSSION

As in most areas, organized group use in the HPWA was a small percentage of the total parties. Nevertheless, the amount of large group use was substantial when viewed as 28,884 days or as .13 visitor days per acre. Because the temporal and spatial distributions of large group use were so similar to that of regular use in the HPWA, the potential for impact on other visitors as well as on the resource base appeared to be high.

Most groups were of teenagers from camps, schools, or scouting. Comprised primarily of novices, groups were taking trips for skills learning, personal growth, or adventure. The size, make-up, purpose, and content of many large group trips suggest that these groups may not have been wilderness dependent. That is, they would not require a designated wilderness area to accomplish their objectives of teaching youngsters the basic skills of backcountry travel.

In general, leaders were college educated adult males, primarily in their twenties. Most had extensive backcountry travel experience but little formal training and few certifications related to outdoor leadership. Although few read backpacking books, over half read related magazines or belonged to an outdoor organization. Nearly all carried stoves, but still built more campfires than many managers or low impact advocates would like. Nevertheless, most were moderate or strong purists in their attitudes about wilderness generally. Within the High Peaks, they recognized social and ecological impacts of overuse and approved of limiting group size. They appeared to be unfamiliar with the many other wilderness and rustic nonwilderness areas in the same region.

CONCLUDING REMARKS

Organized outdoor programs can be part of the problem and part of the solution to overuse in wilderness areas. To the extent that they add to use pressures and use conflicts in wilderness, outdoor programs add to the problem. Conversely, if these program impart on their clients state-of-the-art, low impact camping

Table 10. Affiliations with wilderness/outdoor organizations.

| <u>Affiliation</u> | <u>Number of Leaders</u> | <u>Percent of Leaders</u> |
|----------------------------------------------|--------------------------|---------------------------|
| One or more organization | 92 | 66.6 |
| Organizations Named | | |
| New York State Outdoor Education Association | 8 | 5.7 |
| Adirondack Mountain Club | 23 | 16.6 |
| Sierra Club | 14 | 10.1 |
| Appalachian Mountain Club | 11 | 7.9 |
| American Camping Assoc. | 4 | 2.8 |
| Forty Sixer | 13 | 9.4 |
| Wilderness Society | 2 | 1.4 |
| Other | 38 | 27.5 |

Table 11. Groups use of stoves.

| <u>Use</u> | <u>Absolute Frequency</u> | <u>Relative Percentage</u> | <u>Cumulative Percentage</u> |
|---------------------|---------------------------|----------------------------|------------------------------|
| None, did not carry | 3 | 2.1 | 2.1 |
| None, did not use | 4 | 2.9 | 5.0 |
| For foul weather | 19 | 13.8 | 18.8 |
| For most cooking | 37 | 26.8 | 45.7 |
| For all cooking | 75 | 54.3 | 100.0 |

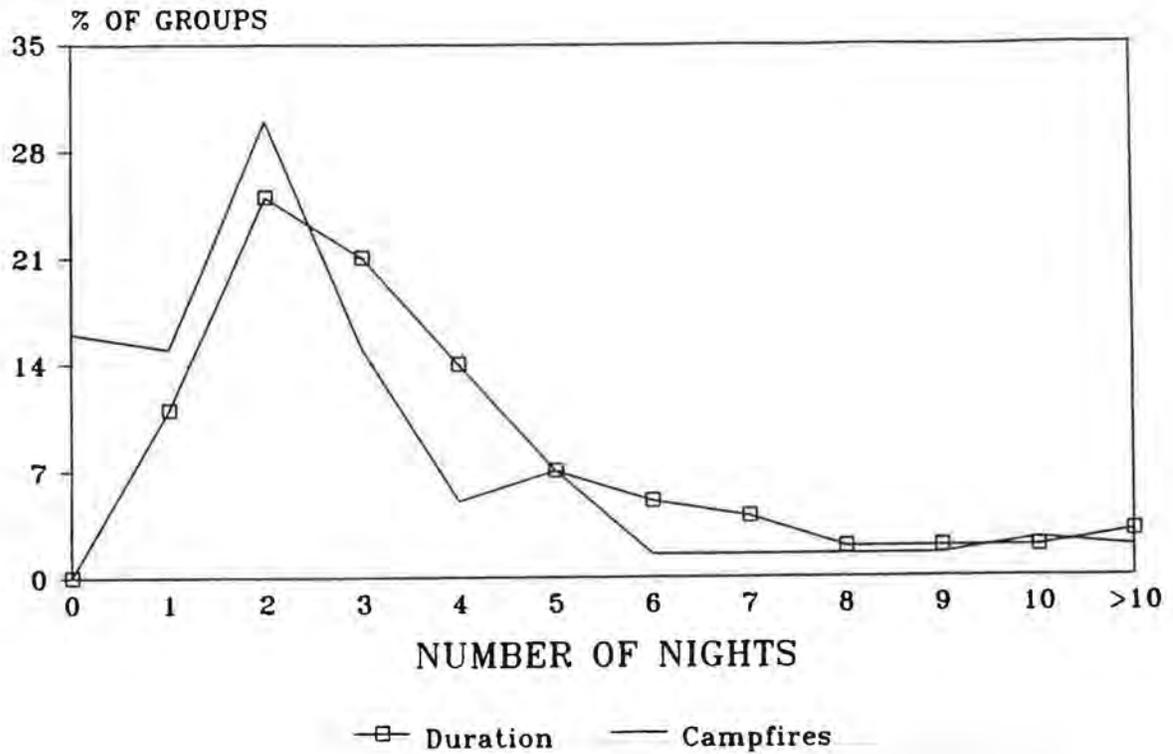


Table 12. Is HPWA used beyond its carrying capacity?

| <u>Leaders Responses</u> | <u>Absolute Frequency</u> | <u>Relative Percentage</u> | <u>Cumulative Percentage</u> |
|--------------------------------------|---------------------------|----------------------------|------------------------------|
| Social-Psychological Capacity | | | |
| Yes, in some places | 84 | 60.9 | 60.9 |
| Yes, in most places | 16 | 11.6 | 72.5 |
| No | 38 | 27.5 | 100.0 |
| Biophysical Capacity | | | |
| Yes, in some places | 89 | 64.5 | 64.5 |
| Yes, in most places | 23 | 16.7 | 81.2 |
| No | 26 | 18.8 | 100.0 |

Table 13. Leaders' opinions on limiting group size in HPWA.

| <u>Limit</u> | <u>Absolute Frequency</u> | <u>Relative Percentage</u> | <u>Cumulative Percentage</u> |
|--------------|-------------------------------|--------------------------------|----------------------------------|
| Yes | 115 | 83.3 | 83.3 |
| No | 21 | 15.3 | 98.6 |
| No response | 2 | 1.4 | 100.0 |

Table 14. Leaders' recommended group size limits.

| <u>Limit</u> | <u>Absolute Frequency</u> | <u>Relative Percentage</u> | <u>Cumulative Percentage</u> |
|--------------|-------------------------------|--------------------------------|----------------------------------|
| 2 | 1 | 0.8 | 0.8 |
| 5 | 1 | 0.8 | 1.6 |
| 8 | 8 | 6.9 | 8.5 |
| 9 | 1 | 0.8 | 9.3 |
| 10 | 31 | 26.9 | 36.2 |
| 12 | 37 | 32.1 | 68.3 |
| 13 | 1 | 0.8 | 69.1 |
| 14 | 3 | 2.6 | 71.7 |
| 15 | 18 | 15.6 | 87.3 |
| 16 | 2 | 1.7 | 89.0 |
| 18 | 2 | 1.7 | 90.7 |
| 20 | 7 | 6.0 | 96.7 |
| 21 | 1 | 0.8 | 97.1 |
| 25 | 3 | 2.6 | 99.2 |
| 30 | 1 | 0.8 | 100.0 |

techniques and attitudes of appreciation, they are an important vehicle for current and future visitor education.

The findings of this study in the High Peaks, an area widely acknowledged to suffer from overuse, suggest that large groups may add substantially to use pressures. At the same time, leaders of these groups appear to be moderately or strongly pure in their concept of wilderness and they themselves agree that party size should be limited. Given their cognizance of overuse problems within the High Peaks and minimal awareness of rustic recreation opportunities available in nearby nonwilderness areas, these leaders may respond well to management suggestions regarding more appropriate camping practices, party sizes, routes, or locations.

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WITHOUT WORDS: USING PICTURES TO MEASURE SOCIAL CONTACT PREFERENCES IN A WILDERNESS AREA*

STEVEN D. MOORE STANLEY K. BRICKLER, Ph.D.

ABSTRACT

Social interactions in a wilderness setting can be an important influence on visitors' recreational experience, particularly those visitors seeking solitude. Research in wilderness areas in the United States has demonstrated that visitors will accept only so many contacts with other visitors during a visit. Knowledge about visitors' preferences for social contact helps the wilderness manager determine what levels of social interaction are appropriate in a particular area and what types of visitor groups will be compatible with each other. Typically, research on social contact preferences is conducted using interviews or self-administered questionnaires. These methods, however, are constrained by the complexities of using words to develop images in respondents' minds. We are testing an alternative to these verbally oriented techniques in our research at Aravaipa Canyon Wilderness, Arizona (U.S.A.). Line drawings are being used to measure people's preferences for having contacts with 12 types of groups in Aravaipa Canyon. Based on our test, we feel that pictures could be a valuable research tool, particularly as a supplement to verbal methods. We also feel that pictures could find a niche in international applications where social research is needed for wilderness areas visited by multi-lingual populations.

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* in Krumpal, E.E. and P.D. Weingart, eds. 1992. Management of Park and Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

INTRODUCTION

Once a place connoting fear, disorder, and confusion, wilderness, to western societies, has come to represent a refuge or sanctuary from the pressures of modern civilization (Nash 1982). In the United States, the sanctuary appeal of wilderness has become nearly synonymous with the experience of solitude: "the state of being alone or removed from others" (Morris 1973). Solitude has even been mandated by the U.S. Congress. Wilderness, according to the Wilderness Act of 1964 (P.L. 88-577), is defined as a place "with outstanding opportunities for solitude".

For many wilderness visitors in the United States, contacts with other people significantly impact enjoyment of their trip. Too many such contacts simply is not conducive to a solitude experience. Unfortunately, many wilderness areas in the U.S. are facing such heavy demand for recreation that, if left unmanaged, solitude would be unachievable. In these areas, visitation is sometimes limited by the managing agency so that solitude is preserved to a degree.

We are currently conducting research to evaluate a visitation limit established by the Bureau of Land Management for Aravaipa Canyon Wilderness in Arizona. A major portion of our research is determining how many social contacts are acceptable to visitors. This information will be useful for confirming the current limit or for establishing a new limitation. In this paper we describe one of the research methods being developed for use at Aravaipa Canyon. Before describing our method, we first examine research conducted in the past on social contact preferences. Then, we outline the social psychological theory that underlies our method. Finally, after presenting our method and some preliminary

results, we review its practical merits and discuss its usefulness for international applications.

A SEARCH FOR HARMONY IN WILDERNESS: SOCIAL CONTACT PREFERENCE RESEARCH

For over 20 years, researchers have been estimating the social contact preferences of visitors to wilderness areas in the United States. Lucas (1964) surveyed paddling canoeists at what is now the Boundary Waters Canoe Area in Minnesota and found that 83% would find meeting one other party per day acceptable and 77% would accept two contacts per day. For the Boundary Waters Canoe Area and three wildernesses in the western U.S., Stankey (1973) plotted ratings of trip satisfaction of visitors against the numbers of other parties they encountered. The "satisfaction curves" that were developed essentially are contact preference curves (Shelby and Heberlein 1986). Judging from the curves, two contacts per day was found to be an acceptable limit. Shelby and Heberlein (1986) found that canoeists on the Brule River in Wisconsin could tolerate seven contacts with other canoeists during their trip.

Interestingly, many researchers also found that contact preferences varied according to the group encountered. Canoeists in Lucas' study were less tolerant of meeting powerboaters than other canoeists. Three types of campers in Oregon found meeting hikers and horsemen acceptable, but disfavored encountering trail scooters (Burch and Wenger 1967). Stankey (1973), however, found horsemen disfavored in one wilderness area, with one contact reducing the satisfaction of more than 30% of the respondents. Finally, Brule River canoeists are relatively intolerant of contacts with "tubers": tolerating only three contacts rather than the seven allowed for other canoeists (Shelby and Heberlein 1986).

A SOCIAL PSYCHOLOGICAL PERSPECTIVE ON SOCIAL CONTACT PREFERENCES

Person Perception

Social psychological research on person perception, snap judgments, and social stereotypes provides a foundation for understanding social contact preferences. Person perception research is founded on the general thesis that the world of experience has structure, stability, and meaning (Schneider et al. 1979). According to this thesis, perception is not a passive translation of physical energies into experience. On the contrary, perception is viewed as a process that demands active participation by the perceiver. The perceiver attempts to make sense out of complexity by making inferences: perceiving other people as causal agents; inferring intentions to their behavior; inferring emotional states; and inferring enduring dispositions or personalities.

Snap Judgments

In participating in the perception process, people use cues to make inferences. Cues can include relatively unchanging visual aspects of a person (for example, hair color, body build, attractiveness, etc.) or even characteristics of a social group (for example, number of people, uniform worn, or activities engaged in). Inferences drawn from static cues are referred to as snap judgments (Schneider et al. 1979). Snap judgments are "off-the-cuff" evaluations of others made in daily life. They represent primitive theories that certain behavioral tendencies, dispositions, or personality traits are associated with certain visual or other cues provided by other people or social groups.

Physical attractiveness research, one aspect of person perception research, has uncovered many such "primitive theories". Overweight people, for example, consistently rank lowest or low on social desirability scales (DeJong and Kleck 1986). They suffer from a "characterological stigma": perceivers generally feel that the overweight are responsible for their condition and associate a lack of self-control with obesity. Goldberg and Gottesdiener (1975) found that perceivers associate support for the feminist movement with less attractive women, regardless of the political stance or sex of the perceiver. Finally, some studies have found that perceivers associate higher social status with

people of greater height (Roberts and Herman 1986).

Social Stereotypes and Wilderness Social Contact Norms

Snap judgments may be based wholly or at least partially on culturally defined stereotypes (Schneider et al. 1979). One definition of stereotype is the tendency to attribute generalized or simplified characteristics to people in groups and to act towards them accordingly (Ashmore and Del Boca 1981). Assigning stereotypes to groups of people is a method of simplifying the world, it reduces the complexities of daily life into a manageable set of snap judgments about others. Using cues provided by other people, we judge what they are like (assign a stereotype), and, drawing upon that judgment, determine how to act toward them.

One action that we can take with regard to other people is to decide whether or not we desire to associate with them. This decision is a social contact preference. We noted earlier in this paper that the social contact preferences of certain wilderness users (e.g. canoeists) vary according to the social group they anticipate encountering (e.g. other canoeists, tubers, or powerboaters). In developing a social contact preference, these users may be associating certain desirable or undesirable traits with other "types" of users. In effect, they are stereotyping wilderness users.

For example, paddling canoeists in the Boundary Waters Canoe Area claim a preference for less social contacts with powerboaters. This preference may go beyond a simple dislike for the sounds of motors in the backcountry. Rather, the paddler may be ascribing undesirable traits to powerboaters. Indeed, research has found that paddlers at the Boundary Waters ascribe lower standards of environmental purity for powerboaters (Adelman et al. 1982). Similarly, but possibly for other reasons, Brule River canoeists prefer less contacts with tubers.

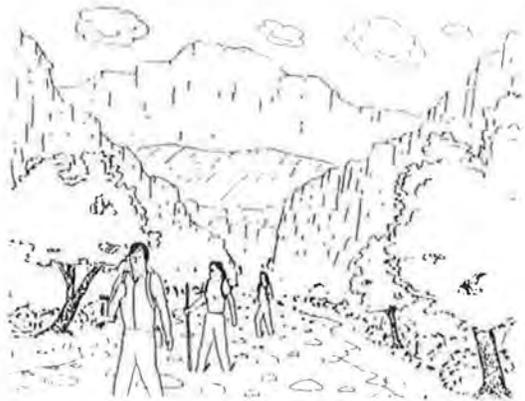
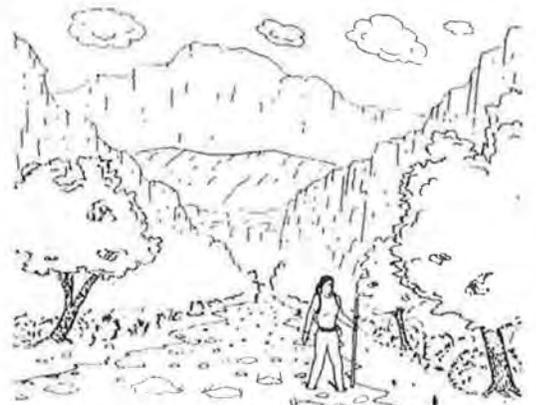
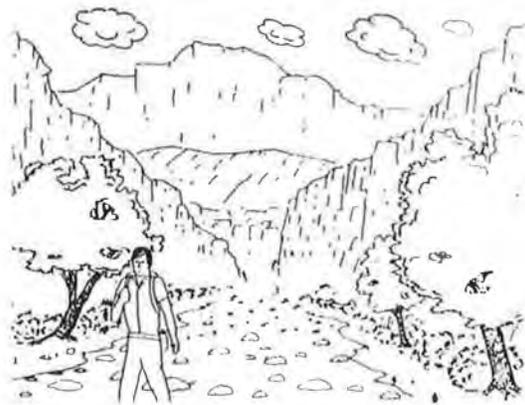
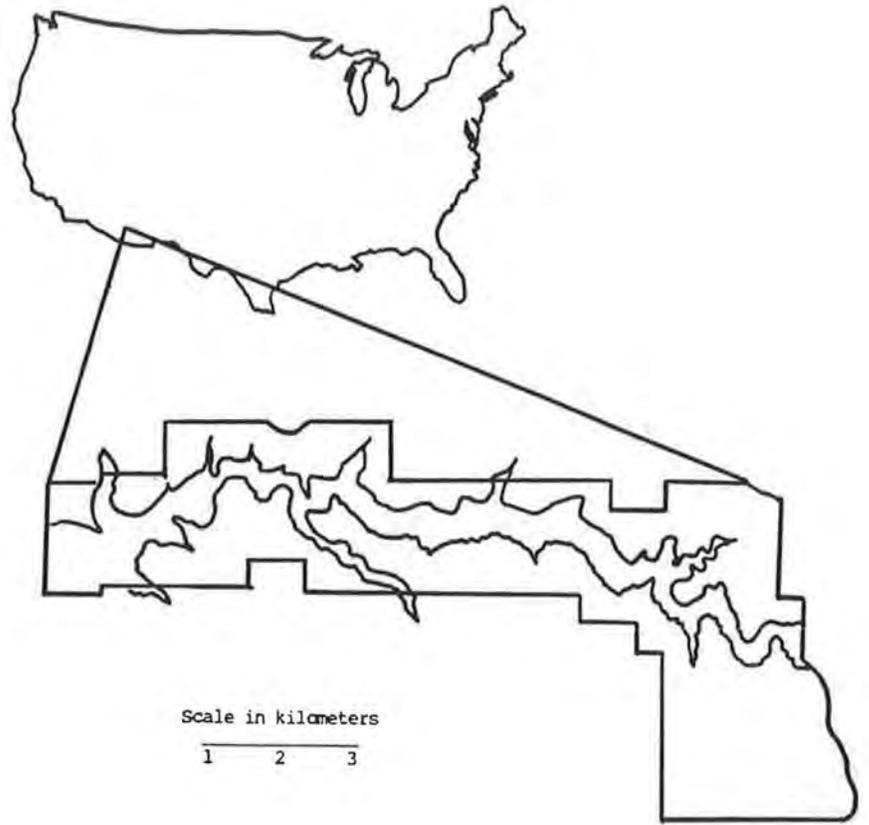
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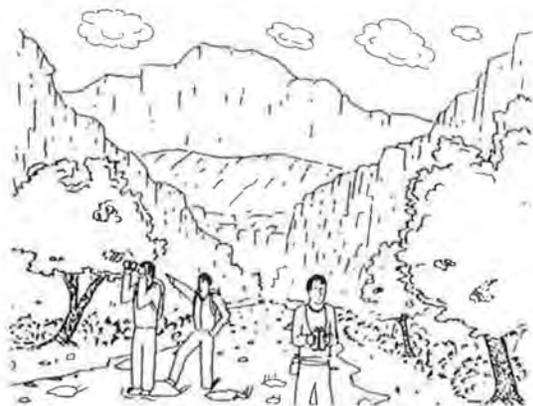
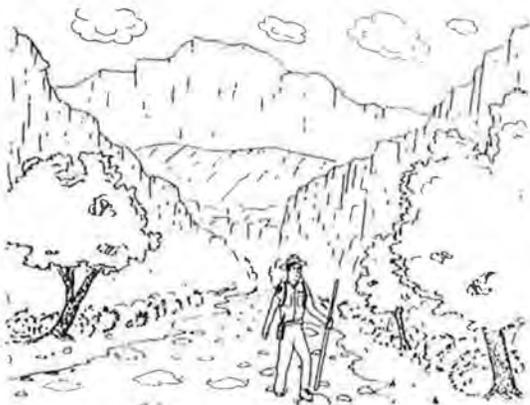
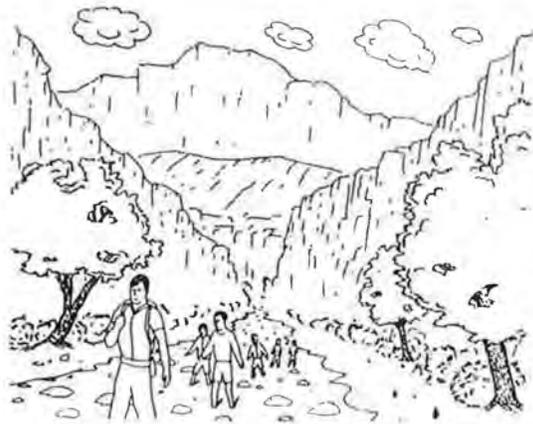
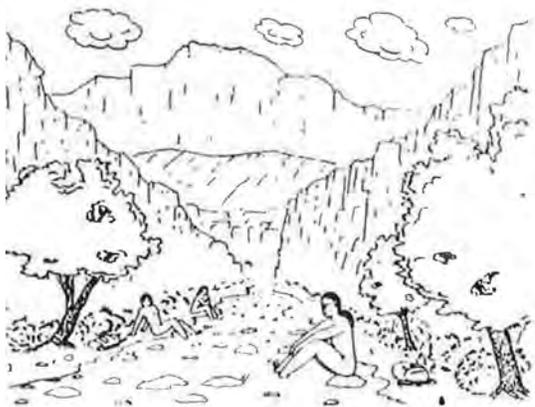
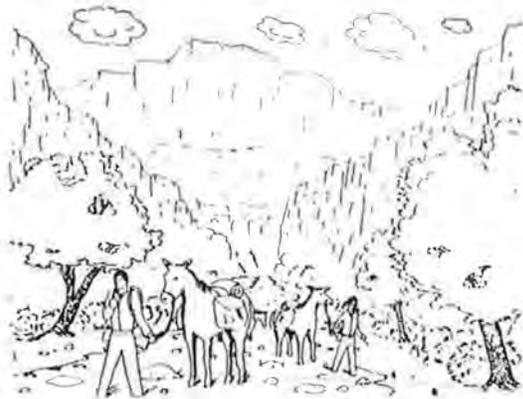
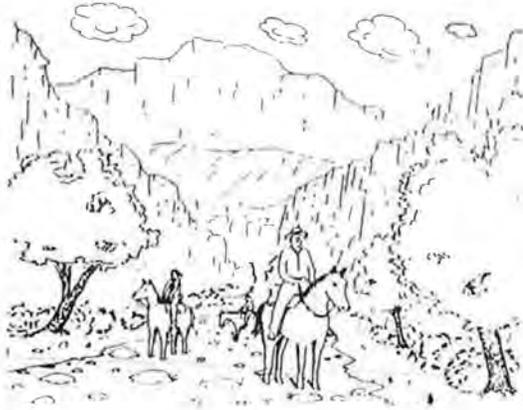
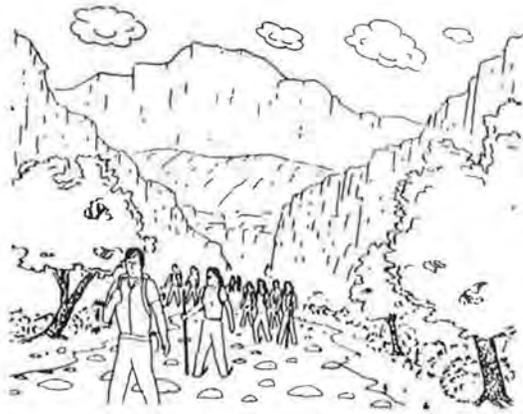
Using Pictures To Conduct Social Contact Norm Research At Aravaipa Canyon Wilderness, Arizona

Research Purpose: We are currently conducting research to identify the social contact preferences of visitors to Aravaipa Canyon Wilderness (ACW) in Arizona (fig.1). As noted in the introduction, the primary purpose of our research is to evaluate the use limitation at ACW. Another purpose of our research is to determine how well visitors can make snap judgments of contact preference based on simple visual cues. We are accomplishing the first objective by conducting a mail questionnaire of visitors. To accomplish the second objective, we are developing a research method that uses pictures rather than verbal descriptions to interview visitors. This paper focuses on the second method.

Research Method Design: In our research we are using twelve line drawings prepared by a graphic artist (fig. 2). Each drawing depicts a type of social group that could be encountered in Aravaipa Canyon: a lone male hiker, a lone female hiker, a small group, a medium size group, a large group, hunters, horseback riders, birdwatchers, hikers with pack animals, nude sunbathers/swimmers, a youth group, and a ranger. Each group is depicted hiking toward the respondent. The background of each drawing is identical. Only pertinent details--the social groups--are manipulated between scenes.

Our technique is based on research conducted by Johnson (1980) on Colorado River raft trips in the Grand Canyon. In his research, Johnson had respondents choose between paired drawings of management and social situations on the river. By showing respondents all possible paired comparisons, a ranking of preferences for the scenes could be determined. (Although our research will incorporate paired picture comparisons, they are not described in this paper.) Artistic renderings have also been used in person perception and wilderness management research. DeJong and Kleck (1986)





describe research that uses line drawings for investigating attitudes about the overweight. Martin and McCool (1986) have used watercolors to research perceptions of and preferences for degrees of campsite impacts in backcountry settings.

During our interview sessions, respondents are shown each scene and are asked to choose an acceptable level of contact for a one-day visit. Five contact ranges are provided: zero times, one to two times, three to five times, six to ten times, and more than ten times. This scale allows us to estimate contact preferences of visitors to ACW. It also permits determination of the relative desirability of encountering various types of groups within the canyon. (Choosing a lower number of acceptable contacts for a particular group indicates a lower level of desirability.)

Research Method Implementation:

Since our research method is in its testing phases, our sampling procedure has been informal, focusing on readily available respondents. Two groups were interviewed during September of 1987: 23 members of an undergraduate class in natural resource recreation and ten staff members of a local advertising firm. Ages of the test respondents ranged from 18 to 40, 76% were under age 30. Fifty eight percent of the respondents were male, 42% were female. Few (12%) had ever visited Aravaipa Canyon Wilderness. Most members of the recreation class were majors in wildlife management.

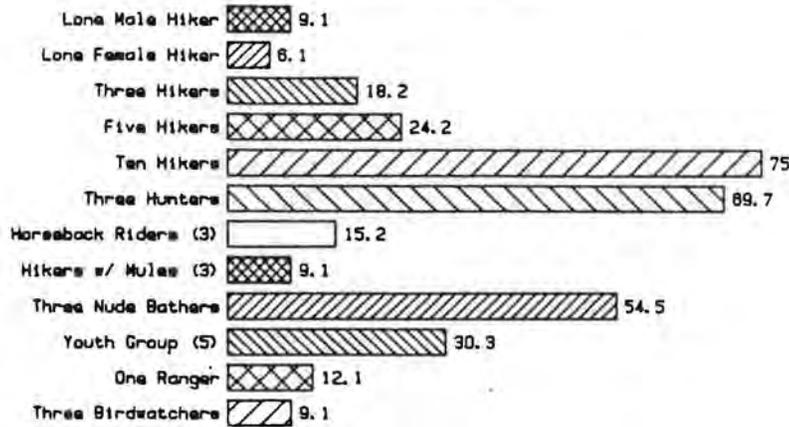
The respondents were interviewed in groups. They were first shown a brief slide presentation on Aravaipa Canyon Wilderness. Then, the twelve scenes were shown on an overhead projector. Each scene was shown for approximately ten seconds. After each scene, the respondents were directed to mark on an answer sheet the acceptable frequency of contact range. The respondents were directed to treat each group individually, not cumulatively. Upon completion of the picture portion of the interview, the respondents were requested to answer a short set of demographic questions.

Research Results: Our test of the picture technique indicates that respondents will express social contact preferences for and discriminate between the groups shown in the twelve pictures (fig. 3). Group size, activity, and mode-of-travel were important considerations to the respondents. In general, as the size of the group increased, contact acceptability decreased. Hunting and nudity were strongly deplored by our respondents. And, travelling by foot was found more acceptable than using domestic livestock.

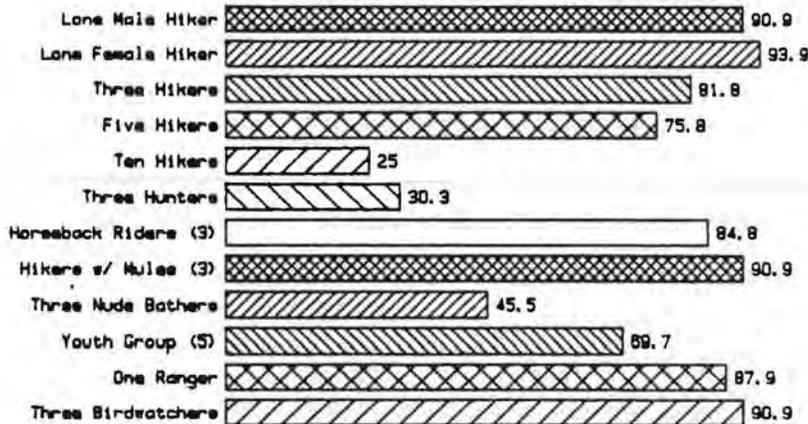
If 50% of the sample is established as an arbitrary "standard" for contact acceptability, the pictures can be divided into three clusters. The first cluster contains those social groups that 50% or more of the respondents would accept up to five contacts per day (fig. 3). Only two groups fall in the first cluster: the lone male hiker and the lone female hiker. The second cluster contains groups for which up to two (but not more than two) contacts per day are acceptable to at least 50% of the sample (fig. 3). Included in this cluster are seven social groups: three hikers, five hikers, three horseback riders, three hikers with mules (pack animals), a youth group of five people, a ranger, and three birdwatchers. Finally, the third cluster contains groups for which absolutely no contacts are acceptable to at least 50% of the sample (fig. 3). Residing in this notorious cluster are three groups: ten hikers, three hunters, and three nude bathers.

While many comparisons can be made from our data, one in particular is interesting from a social psychological perspective: hikers with mules were more socially acceptable to our test respondents than horseback riders. Thirty-six percent of the respondents would accept up to five contacts with hikers using pack animals while only 29% would accept the same number of contacts with horseback riders. This difference appears irrational: since the group sizes are identical, the social (and ecological) impact of each group should be comparable (from an ecological viewpoint there should even be a bias toward the horseback group). Therefore, ratings of contact acceptability should be nearly identical for both groups. For some reason, our test respondents are ascribing more

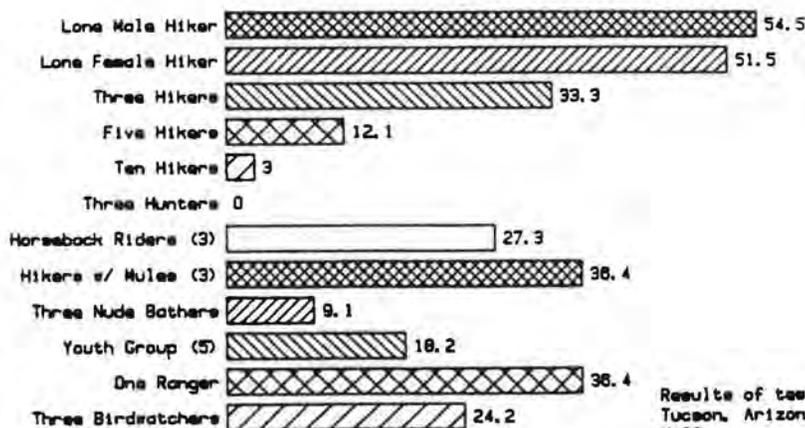
PERCENTAGES OF RESPONDENTS
ACCEPTING ONLY ZERO CONTACTS
WITH EACH SOCIAL GROUP



ACCEPTING UP TO TWO CONTACTS
WITH EACH SOCIAL GROUP



ACCEPTING UP TO FIVE CONTACTS
WITH EACH SOCIAL GROUP



Results of test conducted September 1987,
Tucson, Arizona (U. S. A.).
N=33

favorable consequences to encounters with hikers using mules than to encounters with horseback riders. Possibly, hikers with pack animals appear less imposing than horseback riders.

CONCLUSIONS

Snap Judgments and Stereotyping in Wilderness Settings

Assumedly, the respondents in our test are making snap judgments based on visual cues provided by the drawings. The cues we have provided are simple: group size (small to large); mode of travel (backpacking, horseback riding, or leading pack animals); activity (hunting or sunbathing); and official (ranger). A 10 second exposure has been sufficient time for respondents to form an opinion about how frequently they would like to meet groups of people exhibiting these cues. Extrapolating from basic cues, the respondents have formed a "primitive" theory about how meeting certain groups of people would affect their recreational experience. The individual respondent, from experience or from identification with a particular set of cultural values, has learned to associate acceptable or unacceptable characteristics with certain types of social groups in wilderness.

From a management point of view, the cultural value that leads to stereotyping is of less significance than its expression through contact preferences. Contact preferences of visitors can form the basis for development of social contact standards for a wilderness. These standards guide managers in setting use limitations or in implementing other management strategies that can keep contacts within acceptable levels. Future research may delve into the mechanisms that lead to such preferences. At this point, however, we feel that our picture technique has merit as a tool for conducting social research in American and, for the reasons presented below, international wilderness.

International Considerations: Wilderness Recreation Exporting and Multilingual Populations

Nations that have places of wildness within their borders—whether parks or simply vast stretches of undeveloped land—hold a valuable international commodity. Wildland preserves can be significant generators of revenues from tourism. There exists an affluent international community of wildland enthusiasts who are eager to spend the funds necessary to achieve a wilderness experience that may be unattainable in their homelands. These people are wilderness importers (Nash 1982). The host country is the wilderness exporter.

Nations that export wilderness to citizens of other nations are exporting an experience, not simply a patch of undeveloped land. Thus, to achieve the sort of quality that is desired by the wilderness importers, the exporter must manage wilderness to meet the standards of quality held by wilderness importers. In essence, the exporter must market its export product (wilderness) to desired consumer segments (those importers who will contribute desired funds from tourism but are also compatible with the social and cultural goals of the host country).

One important aspect of the wilderness experience, as highlighted in this paper, is the social component. Where increasing demand is anticipated for its wilderness product, a wilderness exporter may wish to determine what social impacts will stem from increased visitation. Some form of social research is required for this determination. In areas where most visitors share a common language, such as is typical of American wildernesses, there is a vast array of written and oral survey techniques available to the researcher. Where multilingual populations are present, the situation becomes more complicated.

We propose that the picture technique described in this paper could be applied in situations where language barriers are a consideration. The drawings could be adapted to depict social situations relevant to a particular wildland resource. Since little verbal instruction is required to administer the

technique, simple phrases and directions could be used to survey visitors in many international applications. Applied in this manner, pictures could truly become a medium for exchange of cultural values through social research in wildernesses throughout the world.

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CANOES, COMPUTERS, AND COOPERATION IN MINNESOTA'S BOUNDARY WATERS CANOE AREA WILDERNESS*

BARBARA A. SODERBERG

The Boundary Waters Canoe Area Wilderness (BWCAW) is a unique water based natural area located in the northern third of the United States' Superior National Forest in northeastern Minnesota. Over one million acres in size, it extends nearly 150 miles along the International Boundary and is bordered on the north by Ontario's Quetico Provincial Park and on the west by the Voyageur's National Park. Its several thousand portage-linked lakes and streams support 1200 miles of maintained canoe routes, 18 hiking trails, and nearly 2200 campsites designed for a single group of up to ten people. The campsites are designated by a steel firegrate, wilderness pit latrine, and cleared areas for tents. There are currently eighty-seven entrance points serving the BWCAW.

As with other wildernesses in the United States' National Wilderness Preservation System, the BWCAW has no roads, no piped water, and no picnic tables or other modern conveniences. It offers freedom to those who wish to pursue an experience of expansive solitude, challenge, and personal integration with nature. Because the BWCAW was set aside in 1926 to preserve its primitive character and made a part of the National System in 1964, it allows today's visitors to canoe, portage and camp in the spirit of the French Voyageur's of 200 years ago.

VISITOR USE

When visitors first began to obtain travel permits before entering the BWCAW in 1966, use was calculated at less than 700,000 visitor-days (a visitor-day is one person using the area

for 12 hours). During the late 60's and much of the 70's overall use grew at a rate of approximately eight to ten percent annually with paddle canoe use growing at a much faster pace. During the past decade, the rate of growth has tapered off and stabilized at about 1,400,000 visitor-days each year (Anderson and Lime, 1984). It is currently the most heavily visited wilderness in the United States, accounting for 10 percent of total wilderness use within the National Forest System.

The travel permits have provided invaluable information about who the visitors are and how they use the area (Tables 1 and 2).

MANAGEMENT PHILOSOPHY

The Forest Service manages the BWCA Wilderness resource to ensure that its unique character and values are dominant and enduring. To this end, the Agency is guided by Congressional Acts (the Wilderness Act of 1964 and the BWCA Wilderness Act of 1978 [PL 95-495]). Executive Orders, and administrative directives. Basic national objectives apply:

1. Maintain and perpetuate the enduring resource of wilderness.
2. Maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces.
3. Minimize the impact of those kinds of uses and activities generally prohibited by the Wilderness Act, but specifically excepted by the Act or subsequent legislation.
4. Protect and perpetuate wilderness character and public values including, but not limited to, opportunities for scientific

*in Krumpke, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

Table 1. BWCA Wilderness Summer Visitor Use (day and overnight).

| | <u>1985</u> | <u>1984</u> | <u>1983</u> | <u>1982</u> | <u>1981</u> |
|-------------------------|-------------|-------------|-------------|-------------|-------------|
| <u>Use by Residence</u> | | | | | |
| Local (Northeastern MN) | 27% | 25% | 26% | 25% | 28% |
| Twin Cities | 33% | 35% | 34% | 33% | 32% |
| Remainder of Minnesota | 7% | 7% | 7% | 7% | 6% |
| Indiana | 2% | 2% | 2% | 2% | 2% |
| Iowa | 3% | 3% | 3% | 3% | 3% |
| Wisconsin | 7% | 8% | 9% | 7% | 7% |
| Illinois | 9% | 9% | 9% | 11% | 11% |
| Other | 12% | 11% | 11% | 11% | 11% |
| <u>Use By Month</u> | | | | | |
| May | 15% | 15% | 17% | 16% | 16% |
| June | 22% | 22% | 23% | 22% | 23% |
| July | 24% | 23% | 23% | 23% | 23% |
| August | 28% | 28% | 25% | 25% | 25% |
| September | 11% | 13% | 13% | 14% | 13% |
| <u>Mode of Travel</u> | | | | | |
| Paddle | 75% | 75% | 73% | 74% | 71% |
| Motor | 21% | 21% | 24% | 22% | 26% |
| Hiking | 4% | 4% | 3% | 4% | 3% |

Table 2. BWCA Wilderness Summer Visitor Use (overnight only).

| | <u>1985</u> | <u>1984</u> | <u>1983</u> | <u>1982</u> | <u>1981</u> |
|----------------|-------------|-------------|-------------|-------------|-------------|
| Total Permits* | 20,338 | 20,986 | 18,558 | 19,732 | 20,752 |

*Each permit represents 1 group of up to 10 people. Average group size is 4 people and average length of stay is 5 days.

study education, solitude, physical and mental challenge and stimulation, inspiration, and primitive recreation experience.

5. Gather information and carry out research in a manner compatible with preserving the wilderness environment to increase understanding of wilderness

ecology, wilderness uses, management opportunities, and visitor behavior.

The Superior National Forest Land Management Plan (1986) is more specific. It provides direction for three separate management areas in the BWCAW that have been established according to the Recreation Opportunity Spectrum (ROS classes) - Semi-Primitive Motorized, Semi-Primitive Non-

motorized, and Primitive. Each class has different objectives, activities, standards and guidelines, management actions, and monitoring requirements. Because of this, each provides a different range of conditions, settings, and experiences.

THE CHALLENGE

How do wilderness managers provide for human use and enjoyment in the BWCAW, while leaving it unimpaired for future generations? Determining how much and what type of use is consistent with the ROS classes is a formidable challenge. It is further complicated by the area's historic use (amount and type) and its relationship to local users, special interest groups and the area's economy which has recently shifted from a failing iron mining industry to tourism.

The Forest Service has responded to this challenge by establishing specific management objectives for the BWCAW which outline the physical (optimum use without incurring unacceptable ecological change - i.e. soil compaction and erosion, water pollution) and social (optimum use without unacceptable conflict and interference among visitors) requirements for the area.

These requirements are reflected in a carrying capacity or the number of Forest Service campsites (designated by a steel firegrate and primitive latrine) distributed throughout the area. Using measurable indicators (i.e. water quality, soil type and depth, distance between campsites, visual and sound conflicts) managers have determined how many single group campsites could be developed on a lake or cluster of lakes without a deterioration in the wilderness resource.

MANAGEMENT STRATEGIES

Numerous management strategies have been implemented in the BWCAW to ensure that the "limits of acceptable change" are not exceeded for each ROS class. While it's not possible to discuss them all, four of the most significant actions, in terms of setting precedents and standards for wilderness

management activities in North America, are discussed.

Visitor Distribution Program

The BWCAW has enough entry points and routes to accommodate the present demand for use if it is properly distributed geographically. Without controls, however, over half of the visitors would choose to enter at five (out of a possible 87) entrance points. In addition, a disproportionately large number would enter on a weekend (Friday through Monday) or during the last week in July or the first 3 weeks in August. To distribute this use both spacially and temporally, a visitor distribution program was established in 1976 (Hulbert and Higgins 1977).

Controlling travel in wilderness is difficult, and in some respects, undesirable. Many people choose a wilderness experience because of a desire for freedom, spontaneity, and independence. To avoid imposing controls that would restrict these values, the BWCAW Visitor Distribution Program limits the number of overnight permits issued for each entrance point each day. This regulates the rate and distribution of entries, but allows free choice of travel routes and schedules in the interior (Peterson 1977).

The limits or quotas were derived with the help of a flow metering travel model that the Superior National Forest and Forest Service's North Central Forest Experiment Station developed in conjunction with Dr. George Peterson who was then at Northwestern University. The travel model is based on the past travel behavior of BWCAW users who kept a daily record of where they camped each night. Research has shown that travel patterns in the BWCAW are predictable, at least in terms of probability distributions, and that the probabilities are relatively stable from year to year (Peterson, 1981). This makes it possible to "control" the expected or average daily camping population on interior lakes by means of controlling the number of groups allowed to enter at each entrance point each day.

Overnight quotas are in effect from May 1 to September 30 each year and range from 1 group to 40 groups a day at the 87 entrance points. The daily entry point quotas includes overbooking at an average of 13% to compensate for no-shows. In addition, a flexible weekly motor quota (it can be carried over for one week if not used or borrowed from the week ahead) has been established to meet the specific mandates of PL 95-495. If a group wishes to use a motor and camp overnight in the wilderness, there must be both an overnight quota and motor quota available for the entrance point.

Visitor permits, which are issued according to quota availability, may be obtained free of charge from any Superior National Forest Service office or cooperating business (outfitter, resort, camp, etc.) within a 48 hour period immediately prior to the group's planned trip. They may be used only on the specified date, through the specified entrance point, and by the party leader or pre-designated alternate - they are not transferable.

Permits also may be reserved ahead of time (beginning February 1, annually) on a first come - first serve basis for a \$5.00 nonrefundable fee. Reservations are accepted by mail or by phone (with a VISA/Mastercard) at a centralized reservation office located in the Superior National Forest Headquarters. This office houses an on-line system that is very similar to those used by hotel/motels and airlines. It allows Forest Service employees to make inquiries (i.e. check status of quotas), take reservations, print confirmation letters, account for money received, enter permit information, print travel permits, and obtain daily, monthly or yearly status reports. The Visitor Distribution Program was automated in 1982 when it became too complex and time consuming to be handled manually.

Rules and Regulations

Rules and regulations, along with other forms of direct management, are extremely controversial. On the one hand there's a desire for an experience that's "untrammled" - visitors want to get away from the regimentation found

in everyday life and don't expect to find more of it in wilderness. On the other hand, it often is necessary to have some rules and regulations to protect and preserve the very experience visitors are seeking.

It's clear that the BWCAW is a highly regulated wilderness, as is evident by the following rules and regulations, but managers believe they are the "least that is necessary".

Cans and bottles have been prohibited since 1973 with widespread support and compliance. The regulation has been highly effective in reducing most of the estimated 400,000 pounds of refuse which once accumulated annually. This allows precious funds to be used for more productive measures.

Party size is limited to 10 persons, or less, at any time in the BWCAW to minimize the impact large groups have on the wilderness resource. Research has shown that groups often cause more campsite deterioration and compaction; create congestion problems at portages; generally have a higher noise level; cause greater visual impacts on other visitors; and, if several large groups travel together, concentrate use on lakes which have a limited number of campsites.

Camping and open campfires, during the ice-free season, are permitted only at Forest Service established sites having steel firegrates or as specifically approved by Forest Service officials on the visitor's travel permit. This assures that fires will be built in safe locations, reduces the amount of total shoreline that is impacted by human use and, most importantly, facilitates implementation of the Visitor Distribution Program.

Motor-powered watercraft, snowmobiles and mechanical portaging are permitted only where specified in PL 95-495. There has been a steady downward trend in the amount of water acreage open to motor use - it was allowed 62% of the water surface in 1965, it decreased to 33% in 1978 and

will be further reduced to 24% in 1999. Motor size, on routes open to motor-powered watercraft, is generally limited to 25 horsepower.

User Education

In years past, we spoke of wilderness survival as the ability of visitors to survive the wilderness. Now we speak of it as the ability of the wilderness to survive visitors. Such is the theme of the Superior National Forest's User Education Program. Initiated in 1981, it focuses on common management problems in the BWCAW - camping at non-designated sites, fire violations, cutting live trees, use of illegal containers, disposal of fish entrails, litter, large groups, noise (groups/dogs), and visual conflict.

Managers believe that most deprecative behavior in the wilderness is not done maliciously, but because people are unaware of good land ethics or are insensitive to the consequences of their actions. Some choose a BWCAW experience because of its glamor image without really understanding the meaning of wilderness, wilderness values, and appropriate expected behavior. This often results in unprepared and disillusioned visitors.

To resolve these problems, the Forest's User Education Program objectives are to:

- Reduce the impact of visitors on the wilderness resource;

- Assist the visitor in understanding the purpose, value, and appropriate use of wilderness;

- Assist the visitor in understanding the role of natural fire in wilderness;

- Assist the visitor in determining how his/her needs are best fulfilled - through a BWCAW or alternative experience;

- Promote a quality experience; and

- Keep rules and regulations to a minimum.

One aspect of the program emphasizes visitor contact immediately prior to a group's wilderness trip. Staff at permit issuing stations explain the rationale behind rules and regulations by use of a "picture book" and a

campsite display depicting appropriate wilderness practices. It is recommended that all novices and large groups review a slide tape program on minimum impact camping. In addition, a series of user education posters are installed on bulletin boards at all major entrance points.

Another aspect of the user education program, which managers consider more effective, focuses on pre-trip contacts, perhaps several months before the trip, when groups may be more willing and able to accept Forest Service suggestions. One method of reaching potential visitors, particularly in the Minneapolis/St. Paul area (where 39% of all overnight visitors reside) is through an intensive four-hour training session. A cadre of dedicated volunteers initially designed the course and continue to be involved by advertising and scheduling sessions, providing leadership, and updating handout materials. A Ph.D. thesis was recently completed through the University of Minnesota which examined the immediate and long-term cognitive and behavioral changes that occurred after participation in the user education training session (Jones, 1987). The author found that there was significant change for intentions, attitude, behavioral beliefs, and knowledge.

A wilderness ethics brochure is now included with all information requests and a greater effort is being made to familiarize people with the wide range of recreation opportunities available throughout the Forest. This enables visitors to match their group's needs and desires with those areas that will best meet their expectations.

Partnerships

To manage such a fragile, unique and controversial area, there must be meaningful cooperation and close coordination with others. A number of partnerships have developed over the years, but most significant is a long standing relationship with Canada's Ontario Ministry of Natural Resources.

Ontario's Quetico Provincial Park and the BWCAW share a common boundary, have

similar management objectives and strategies (Table 3), and serve many of the same visitors. For those reasons there are frequent formal and informal meetings between the field and administrative staff, enforcement officers often join forces in border patrols, and there is radio communication between the two countries. This spirit of international cooperation assures the preservation of one of North America's greatest treasures.

Another very important and valuable partner is the Minnesota Department of Natural Resources (MDNR). The Superior National Forest has had a formal agreement with them since 1971, which states that the Forest Service will maintain scattered State campsites and portages in most of the BWCAW in exchange for the MDNR providing some funding, a MDNR employee that is assigned to Forest Service field crews during the summer months, and management of a 30,000 acre unit that is primarily in State ownership but is intermingled with several Federal parcels which contain recreation facilities. This arrangement is supported by both agencies. It involves State employees in direct management which gives

them the experience necessary for setting policies and implementing programs.

For the past several summers more than 40 full time volunteers and numerous groups have donated their time and talents to the Forest's wilderness management program. Faced with providing a quality experience to growing numbers of visitors with reduced budgets, Forest Service officials were challenged to "do more with less". Volunteers seemed to be a logical solution. Through this relatively new partnership, volunteers are supplementing paid staff as wilderness information specialists, members of trail crews, wilderness rangers, wilderness rehabilitators, and archaeological aides. The Forest Service benefits annually from the \$150,000 worth of wilderness work accomplished, but there are intangible benefits as well - increased understanding, support and appreciation for wilderness policies and programs; access to skills and information otherwise unavailable; and the spirit the volunteers continue to generate in the organization (Soderberg, 1983).

Table 3 - Visitor Use Regulations in the BWCA Wilderness and Quetico Provincial Park*

| <u>Regulation</u> | <u>Year Implemented in the BWCA</u> | <u>Year Implemented in Quetico</u> |
|------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| Visitor permits required. | 1966 | 1956 |
| Visitor Distribution Program established | 1976 | 1977 |
| Cans and bottles prohibited. | 1973 | 1977 |
| Group size limited. | 1968-15 persons 1975-10 persons | 1977-9 persons |
| Area open to motorized travel. | 1965-62% of water acreage 1978-33% of water acreage 1999-24% of water acreage. | 1975-partial ban 1979-total ban for general public |

*Modified from Anderson and Lime (1984).

Other partners include researchers who have played an important role in management since the 1950's by providing good scientific information, local outfitters and resorts who issue visitor permits and provide user education, and special interest groups who continually examine the area's objectives and challenge managers to defend their decisions.

This discussion leads to an obvious conclusion - the Forest Service can't manage the BWCAW alone. But through partnerships, that will become more important as there is increasing competition for administrative resources, the American public can be assured of an "enduring resource of wilderness".

CONCLUSIONS

Managing the Boundary Waters Canoe Area Wilderness is tremendously exciting, challenging and rewarding. Because it's so often "on the leading edge" there are many trials and tribulations as well as successes. Heavy visitor use forces managers to continually seek innovative methods for protecting the wilderness resource without destroying the spiritual value. It's important to remember that a sense of wildness, solitude and freedom is as fragile as the lakeshore itself. The choices aren't often easy, but Aldo Leopold provided some good advice when he said:

"A thing is right only when it tends to preserve the integrity, stability, and beauty of the community; and the community includes the soil, water, fauna and flora, as well as the people."

In the BWCA Wilderness it's also right when visitors can enjoy their solitary, natural experience unaware that it was made possible by intense management, modern day technologies, and a rich blend of partnerships.

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**THE PARADOX OF MANAGING NATURAL SYSTEMS IN
WILDERNESS**

**THE USE OF FIRE TO MAINTAIN INDIGENOUS VEGETATION IN WILDERNESS
SYSTEMS IN SOUTHERN AFRICA**

W.R. Bainbridge, Natal Parks Board

**A PROPOSED STRATEGY FOR HABITAT MANAGEMENT FOR THE
WILDERNESS AREAS OF SOUTHERN AFRICA**

D.R. MacDevette, Natal Parks Board

**FOREST PROTECTION IN WILDERNESS MANAGEMENT: THE SOUTHERN PINE
BEETLE AND THE RED-COCKADED WOODPECKER**

David L. Kulhavy, Stephen F. Austin State University

Ralph Costa, USDA Forest Service

Kelly Hogan, Chihuahua Desert Research Institute

James H. Mitchell, Stephen F. Austin State University

**THE EFFECTS OF WILDERNESS RECREATION ON AVIAN SPECIES RICHNESS
IN THE EAGLE CAP WILDERNESS AREA, NORTHEASTER OREGON**

Kathryn M. Ebert, Washington State University

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THE USE OF FIRE TO MAINTAIN INDIGENOUS VEGETATION IN WILDERNESS SYSTEMS IN SOUTHERN AFRICA*

W.R. BAINBRIDGE

ABSTRACT

The category "wilderness area" is not yet accepted in the international suite of protected area categories, but wilderness areas have been declared in many countries. Management objectives for the wilderness area category are proposed. Fire plays a crucial role in the ecology of vegetation in grassland, fynbos and savanna biomes, which are adapted to regular and frequent burning, and which are present in many dedicated wildernesses in southern Africa. Natural causes of fire include physical induction, lightning induction and primitive man. It is thought that, historically, anthropogenic fires were a principal cause of fire; they also outweigh other causes in the recent past. It is contended that wilderness managers have no alternative but to design prescribed burning programs to achieve management objectives for wildernesses in the absence of primitive man. Formal procedures for this are recommended. A case history of a prescribed burning program for wildernesses in the Natal Drakensberg is presented.

INTRODUCTION

The International Union for the Conservation of Nature and Natural Resources has proposed a system of categories of protected areas with corresponding objectives for each category (IUCN/UNEP, 1986). While the wilderness area category is not yet included in this list, wilderness areas have been declared in a number of countries. South Africa was the first country in Africa to recognize wilderness areas as a conservation category and has already proclaimed nine wilderness areas. Wildernesses

are also conserved throughout the region as zones in other categories, particularly in the national park category. The protected area suite of categories is intended to permit individual countries to conserve outstanding examples of their natural heritage as a contribution to overall environmental conservation. The principal functions of these areas include the protection of sample ecosystems, the preservation of genetic diversity, the maintenance of essential ecological processes, and environmental regulation. Bainbridge (1984) suggested that the category wilderness area should receive recognition in the international suite of protected areas, and that it is as well suited as other categories to contribute to national and global conservation programs.

The wildernesses that have been dedicated in the region are composed of one or more vegetation formations of the five biomes, defined by Huntley (1984), listed in Table 1. The vegetation formations of three of the five biomes are regarded as fire-dependent and thus require regular firing for their maintenance.

This paper makes recommendations for the primary conservation objectives for the wilderness area category and wilderness zones in other categories. It discusses requirements for defining prescribed burning regimes to achieve these objectives. It also examines the use of fire as a management tool for the maintenance of fire-dependent native vegetation in wildernesses on the subcontinent of southern Africa.

*in Krumpel, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

Table 1. Selected Primary Conservation Objectives for the Protected Area Categories "National Park" and "Wilderness Area". (Source: IUCN 1978a;1986.)

| Primary Objective | Maintain Sample Ecosystems in Natural State | Maintain Ecological Diversity & Environmental Regulation | Conserve Genetic Resources | Provide Education, Research & Environmental Monitoring | Conserve Watershed Condition |
|-----------------------------------|---------------------------------------------|----------------------------------------------------------|----------------------------|--------------------------------------------------------|------------------------------|
| Category | (1) | (2) | (3) | (9) | (4) |
| I National Park ^(a) | 1 | 1 | 1 | 2 | 1 |
| II Wilderness Area ^(b) | 1 | 1 | 1 | 1 | 1 |

| Primary Objective | Provide Recreation & Tourism Services/Wilderness Experience | Protect Scenic Beauty & Open Space/Wild Character | Protect Sites & Objects of Cultural & Historical Archaeological Heritage | Provide for the Sustained Use of Plant & Animal Products | Stimulate Rational Sustainable Use of Marginal Areas & Rural Development |
|--------------------|-------------------------------------------------------------|---------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------|
| Category | (6) | (5) | (10) | (8) | (7) |
| I National Park | 1 | 1 | 1 | - | 1 |
| II Wilderness Area | 1 ^(c) | 1 | 1 | 3 | 1 |

NOTES: (a) Priority ratings for the category "national park", from IUCN and NR/UNEP (1986).
 (b) Proposed priority ratings for the category "wilderness area".
 (c) Wilderness areas are roadless; recreational opportunities are restricted to resource-based wilderness experience.

Priority ratings: 1. Priority objective for management of area and resources.
 2. Not necessarily primary, but always included as an important objective.
 3. Included as an objective where applicable and whenever resources and other management objectives permit.

**CONTRIBUTIONS MADE BY
WILDERNESS TO THE CONSERVATION
OF NATURE AND THE ENVIRONMENT
IN THE REGION**

The system of protected area categories developed by IUCN lists primary conservation objectives for each category. Table 2 lists the principal conservation objectives defined for the national park category and those now proposed for the wilderness area category.

From Table 2 it is apparent that both categories are well suited to play a major role in all ten of the principal conservation functions normally performed by protected areas. The large area of land that is usually conserved in individual wilderness areas or national parks is a significant factor contributing to their viability as ecological reserves. Bainbridge (1984) has also pointed out that "wilderness area" is an appropriate category for the conservation of fragile or environmentally sensitive landscapes, such as high mountain systems and watershed

areas, because of the implied low recreational levels appropriate for the provision of wilderness experience.

THE ECOLOGICAL ROLE OF FIRE

There has long been appreciation that periodic perturbations by fire are essential for the functioning of fire-dependent ecosystems (Heinselman, 1978). Research on the responses of vegetation to fire and the effects of various fire regimes has been carried out on the subcontinent since the 1920's. Work in the past 30 years has indicated that fire profoundly influences the structure and composition of vegetation of the three fire-dependent biomes of the subcontinent listed in Table 1, as indicated below.

The crucial ecological role played by fire in the area has been summarized by a number of authors. Edwards (1984) states that there is a general recognition that most vegetation formations in the region are subject to burning

Table 2. Description of Major South African Biomes. (Source: Huntley, 1984.)

| Biome | Description | Fire Dependence Rating |
|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| 1. Fynbos | Evergreen sclerophyllous heathlands and shrublands of the southwestern and southern Cape. | + |
| 2. Karoo | Arid to desertic regions occupied by low shrubs, succulents and desert grasses. | - |
| 3. Grasslands | a) natural grasslands of the highveld b) "false" grasslands of the higher rainfall area | + +? |
| 4. Savanna | a) arid savanna—spinescent, usually fine-leaved wooded grasslands and thickets of base-rich substrates in hotter, dryer regions b) moist savanna—deciduous broadleaf savanna and woodlands (miombo) of acid substrates and mesic to moist rainfall regions | - + |
| 5. Forest | a) coastal lowland forest b) Afromontane forest, dominated by <i>Podocarpus</i> spp. usually at altitudes of 1500 m + (but at lower levels at the southern limits of distribution) | - - |

+ = fire dependent
- = not fire dependent

at some time, but there is great variation in the frequency and intensity of burns. Biomes such as grassland, fynbos and savanna are adapted to regular and frequent firing and have many component plant species whose evolutionary development accords with community behavioral responses to fire (Bews, 1925; Bayer, 1955; Trapnell, 1959; Bean, 1962; Gordon-Grey and Wright, 1969). Other biomes such as evergreen forest, however, are rarely subject to fires.

Tainton (1981) states that recurrent fire, initiated by lightning and other natural causes (including primitive man), has been a determining factor influencing the structure and composition of grasslands and savanna and possibly the distribution and extent of forests and other woody vegetation. Kruger and Bigalke (1984), reviewing the effects of fire on fynbos, states fire regime should be viewed as a stochastic process, varying temporally and spatially within certain wide limits. It is partly this variability that permits the existence of so large a number of species in the fynbos biome, which are diverse in form, phenology and life history. The process of pyric succession itself savanna instead of woodland or forest. However, while the role of fire in the high-altitude "true" grasslands is not understood, it now appears that it is possible that they are also fire-dependent, i.e. without frequent defoliation by fire, successional changes towards the climax (heath communities) would take place. Throughout both montane and alpine grasslands, a mosaic of grassland and woody communities exists with woody vegetation occurring in refuge habitats or southerly slopes which are subject to burning infrequently because of moist conditions, slope, terrain type, etc.

Recent research at Cathedral Peak by Everson (1985) in montane grasslands confirms the influence of fire on the structural and functional dynamics of the floral constituents of montane grasslands, the most extensive vegetation type of the wilderness areas of the Natal Drakensberg. Everson concluded that a regular fire regime is necessary to maintain natural areas of montane grasslands in optimal conditions, i.e. for species diversity to be maintained at maximum levels and for soil

allows coexistence of plant and animal species by preventing final dominance of the plant community by one or a few species and by allowing dynamic local migrations.

Fire also plays a major role in the maintenance of grasslands. With or without the role of other forms of defoliation, the fire regime determines the nature of the sward. Deferral of fire results in accumulation of litter, senescence and mortality among plants in the sward, and, presumably, the ultimate extinction of the grass plants themselves, and is accompanied by an overall decline in basal cover (Kruger and Bigalke, 1984, quoting West, 1965; Tainton and Mentis, 1984).

Two primary formations of the grassland biome are recognized: the so-called climatic climax or "true" grasslands, and the fire-climax or "false" grasslands (Huntley, 1984). In the case of the former, it was originally considered that the balance between herbaceous and woody strata was determined by climatic or pedologic conditions. In the case of the latter, it was considered that fire regime was responsible for maintaining grassland or losses to be minimized through maintaining cover at optimum levels. He showed that two standard prescribed burning treatments, annual winter burns and biennial spring burns, applied over a period of 30 years, were not significantly different in their ability to maintain veld condition, i.e. no significant changes of proportional composition of the dominant species occurred. These burns maintained productivity and canopy cover for the provision of protection for the soil.

Fire regime has also been shown to influence the abundance of antelope. Rowe-Rowe (1982) showed positive responses to fire in the five most common antelope of the Natal Drakensberg, which feed on recently-burnt veld in preference to unburnt veld. The antelope, however, use unburnt grasslands for cover, especially for concealing their young.

Grassland bird species also respond positively to fire. Mentis and Bigalke (1979) found that populations of francolin flourish in biennial burns but decline in abundance in the

absence of fire. Little and Bainbridge (1985) have shown that most grassland birds are ecologically adapted to the presence of fires in the dormant period. Breeding activities are initiated in late spring in most instances and terminate by the end of autumn, thus avoiding the period when the grasslands are flammable and when nests or young could be destroyed. Breeding thus also coincides with the period of maximum growth activity when food supplies are most abundant.

FIRE AS A MANAGEMENT TOOL TO ACHIEVE PRIMARY CONSERVATION OBJECTIVES IN WILDERNESS AREAS AND ZONES

Miller (1984) proposed the set of conservation objectives now adopted by IUCN, shown in Table 1. The expanded objectives applicable for nature and environmental conservation are as follows (with emphasis added):

1. Maintain large areas as representative samples of each major biological region of the nation in its natural, unaltered state to ensure the continuity of evolutionary processes, including animal migration and gene flow.
2. Maintain examples of the different characteristics of each type of natural community, landscape and land form to protect the representative as well as the unique diversity of the nation, particularly to ensure the role of natural diversity in the regulation of the environment.
3. Maintain all genetic materials as elements of natural communities, and avoid the loss of plant and animal species.
4. Maintain and manage watersheds to insure an adequate quality and flow of fresh water.

The evidence obtained by a considerable number of independent researchers on the role of fire in the maintenance and functioning of fire-dependent ecosystems in the region (Table 1), clearly indicates that the management objectives recommended by IUCN for the national park category, now recommended for the wilderness area category, cannot be achieved

without recurrent and extensive perturbation by fire.

The particular components of the above objectives that refer to essential ecological processes and genetic diversity for which fire is a driving variable have been emphasized in the objectives above.

THE HISTORICAL FIRE REGIME

There is much general information, but very little detail on the nature of the historical fire regime of the region. Edwards (1984) has summarized recent historical records and found that all three natural causes of veld fires (physically-induced fire—falling boulders, earthquakes, etc.; lightning-induced fire; and anthropogenic fire) were active in the region in historic times. Physically induced fires have been recorded on a number of occasions, but this ignition source is limited and confined to mountainous terrain, accounting for not more than 1 percent of fires recorded for the Western Cape area. Lightning-initiated fires occur throughout the region, and is an important natural source of ignition during the late spring/early summer period. It has caused veld fires in the Cape, but it is in the eastern parts of the region, in the summer rainfall areas of Zimbabwe, the Transvaal and Natal, where it has its greatest effect.

Edwards also analyzed the causes of fires started on state forest lands throughout South Africa in the 19-year period between 1959 and 1977. Of a total of 4668 fires, 555 fires (12%) were lightning induced. Granger (in preparation) analyzed the reported causes of fire in the Natal Drakensberg area over a 73-year period (1906-1979) and found that lightning was the cause of between only 1 and 3 percent of all fires. Even though strikes may cause fires infrequently, once initiated, the fires may be widespread. Pienaar (1968) reported a fire started by lightning that spread over 780 km² in the savanna vegetation of the Kruger National Park. Edwards also reports that the highest number (3020 or 65%, of a total of 4668) of fires on state forest land were anthropogenic; with a further 1093 (23%) of unknown origin, which almost certainly included some man-made

fires. Granger (in preparation) found that man-made fires accounted for between about 86 and 95 percent of all fires started in the Drakensberg mountains, with unknown causes (including some man-made fires) accounting for between about 2 and 14 percent.

Hall (1984) studied the historical and traditional use of fire by man on the subcontinent. He states that "although much of the evidence is insubstantial and reconstruction of patterns speculative, it is reasonable to conclude that man has been introducing fire into the more open vegetation types of southern Africa for more than 150,000 years and that such fires have often been extensive. Thus anthropogenic fire, first a factor in the late Pleistocene environments, have been part of southern African ecosystems throughout the Holocene and, therefore, throughout the period that the plant and animal species comprising these ecosystems have been adapting to contemporary climatic conditions. Perhaps, given this antiquity, it would be better to see anthropogenic fires as a central component of some heath and grassland communities, rather than as an extraneous factor." Savanna (especially moist savanna) formations should also be included in this list.

DESIGNING PRESCRIBED BURNING PROGRAMS TO ACHIEVE THE PRINCIPAL MANAGEMENT OBJECTIVES FOR WILDERNESS AREAS AND ZONES

Heinselman (1978) recommends that a principal goal of wilderness management should be to "restore fire to its natural role in the ecosystem to the maximum extent consistent with the safety of persons, property and other resources." He suggested that managers should determine, as far as possible, the precise nature of the natural regime and attempt to simulate this.

There are severe limitations to an approach of restricting fires in wildernesses to those initiated by natural causes in the region for the following reasons:

- * There is a lack of reliable information on the precise nature of the fire regimes of antiquity.
- * While there is reliable information that primitive man was a principal agent responsible for the natural fire regime, the area is no longer occupied by such people.
- * Anthropogenic fires are now started by modern man with readily available ignition sources (matches), whose objectives for burning include agricultural practices, hunting, etc., which take place at frequencies and times which almost certainly differ substantially from those of the natural fire regime.
- * Lightning, previously the second most important cause of natural fire, is still present, but it constitutes a relatively insignificant source of ignition in comparison with anthropogenic fires.

There are other contributory reasons for not relying on natural agents to initiate fires in the wildernesses. The fact that most protected areas are relatively small in size in comparison with the surrounding developed areas, they are not protected by buffer areas and are constantly assailed from without by wildfire or burns applied for agricultural or other purposes. Experience has shown that wildfire from without becomes the principal form of ignition within the reserve (in the absence of a prescribed burning system). The wildfires are not always applied at times and frequencies that favor the management objectives.

Wilderness managers in the region, therefore, have no alternative but to design prescribed burning systems to achieve the authorized management objectives for each individual protected area. In the absence of the original principal natural ignition source, primitive man, it is not tenable to rely exclusively on the remaining natural ignition source of lightning- and physically-induced fires.

The procedure for the definition and formalization of management prescription and actions described by MacDevette (1987) is recommended for the design of a prescribed

burning program for individual areas. The recommended procedure includes:

1. definition of management objectives and goals;
2. the construction of an ecosystem model (of which one or more fire models would be components); and
3. use of the model, together with a knowledge base (management experience together with research results) for the formulation of alternative burning treatments, the likely effect of each having been defined.

This process will result in the selection of one or more treatments for implementation. Long-term monitoring of the effects of these must then be implemented and the treatments refined over time as necessary. Expert systems may be used for the integration of the mathematical systems models with rules from the knowledge base, for the provision of alternative action possibilities, to achieve objectives and goals, and to make statements on the consequences of the various alternative management actions.

It is emphasized that the formal procedure recommended is heavily dependent on the knowledge base, which consists of applied research which has investigated the effects of different burning treatments within the area, together with the accumulated knowledge of experienced managers, over time. It is also dependent on the reliability of the ecosystem model. The overriding importance of a carefully designed environmental monitoring program to monitor the effects of the proposed applied burns on an objective, repeatable basis, is also emphasized.

THE PRESCRIBED BURNING PROGRAM FOR WILDERNESS AREAS IN THE NATAL DRAKENSBERG

A prescribed burning program for grassland formations was designed for the entire state forest system in the Natal Drakensberg (Bainbridge, 1986; Scott and Bainbridge, 1987). The prescribed burning treatments are based on a number of premises which include:

- * The vegetation formations of the Drakensberg are stable.
- * They may be maintained in a stable state by applied burns which research has indicated produce no significant change in composition of dominant species over a 30-year period.
- * The abundance of the majority of rare species will remain relatively constant if no significant change in relative abundance of the numerically dominant species is recorded.
- * Maintenance of the vegetation communities in a vigorous state will ensure maintenance of viable faunal populations and faunal diversity.

The prescriptions provide for burns to be applied throughout the period of dormancy for grass growth, in the burning periods, early winter, winter and spring. Specific aims include:

- * Make provision for the most favorable known treatment (to achieve the principal management objectives) for each formation.
- * Provide for phased reduction of fuel loads over the entire dry season, in the three burning periods described, applied in a mosaic pattern to reduce the risk of wildfire.
- * The grasslands are exposed to a variety of treatments which promote ecological resilience.
- * Provision is made for ecotone development in fire-sensitive communities such as forest.
- * The control of invasive alien vegetation.
- * Acceptance of fires initiated by natural causes (e.g., lightning) in the prescriptions, and for the control of wildfires that do not conform to prescriptions.

The entire area is subdivided into a system of management units consisting of drainage basins as primary units (blocks), separated by watersheds and, in some instances, firebreaks. Each block is separated into secondary management units (compartments) consisting of

areas of similar terrain, soil type and microclimate and, therefore, with fairly uniform growth response, which thus requires relatively uniform burning treatments. Compartments average about 500 ha (350-700 ha) in extent and are separated by permanent boundaries that may be employed to control fires, such as paths and natural features including streams, terrain changes, and occasionally prepared breaks.

Burns are applied under conditions where the fire may be controlled. Models have been developed to predict rates of spread for specific fuel type and weather conditions (Everson et al., 1987). It is a requirement that applied burns are contained within the compartment under treatment. There is a legal requirement in South Africa that landowners are responsible for ensuring that fires do not escape; they may be liable for damages caused by wildfire that spread from the property. Field staff are required to contain an applied burn to the compartment where it was initiated.

The burning treatment applied is the treatment that research has shown is suited for the achievement of the management objectives. An environmental monitoring program has been designed to test the long-term impact of the burning treatments on species composition. Long-term research programs have been initiated to test a variety of effects, such as soil loss rates.

CONCLUSIONS

A prescribed burning program is necessary to achieve management objectives for dedicated wilderness zones in southern Africa that contain fire-dependent vegetation. A formal procedure for defining such a program and for monitoring goal-achievement is necessary.

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A PROPOSED STRATEGY FOR HABITAT MANAGEMENT FOR THE WILDERNESS AREAS OF SOUTHERN AFRICA*

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ABSTRACT

Wilderness areas are found in South Africa, Mozambique, Zimbabwe, Zambia, Botswana, Namibia and Angola. Problems with the management of these areas often lead to a situation where management objectives are not being met, or managers do not know whether they are being met or not. First world management strategies based on a large capital and personnel outlay are inappropriate for most of these areas.

Due to the relatively specific fire treatments required by many species in southern Africa and the deleterious impacts caused by large ungulate populations and wilderness visitors, active management by man is essential for the achievement of the management objectives proposed. A scientific management strategy using the latest appropriate technology and available human resources is described. It consists of:

- (1) Formulation of clear management objectives and goals.
- (2) Information systems planning.
- (3) Inventory and description of the natural system.
- (4) Formal procedures for the definition of management actions.
- (5) Monitoring.

The use of key species, expert systems and ecological modeling is discussed.

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INTRODUCTION

In the southern Africa region, legally proclaimed Wilderness Areas are only found in South Africa. There are, however, many de facto wilderness areas in Botswana, Zimbabwe, Namibia, Mozambique, Zambia and Angola.

Common problems with the management of these wilderness areas are: (1) shortage of funds, (2) shortage of staff (particularly scientifically trained staff), (3) problems of accessibility due to poorly developed infrastructure and (4) problems with the management of tourists and poachers, which require large amounts of management attention. These often result in a situation where the management objectives are not being achieved, or where the managers do not know whether they are being achieved or not.

First World management strategies based on a relatively large capital and personnel outlay are inappropriate for most of these areas. Cost effective, scientific management strategies need to be developed to ensure that wilderness areas fulfill their national and international conservation functions. These strategies need to use appropriate technology, make full use of the existing resources and must be feasible under the conditions prevailing in southern Africa. Active participation in the management of wilderness areas by the people living on the peripheries is highly desirable.

The purpose of this paper is to present a scientific management strategy for habitat management in the wilderness areas of southern Africa, although the strategy has more general application.

THE NEED FOR WILDERNESS MANAGEMENT

Two management systems are available for the management of wilderness areas. The first is that of benign neglect, where there is a belief that the management objectives will be achieved in the absence of intervention by managers. The second, which is proposed here, is the management of wilderness areas for stated objectives, through the direct intervention of man, where necessary. It is suggested that the management objectives proposed in Table 1, which generally have wide international acceptance, should form the basis for the management of wilderness areas.

The southern African wilderness areas have been subjected to fire for 150,000 years and regular fires for at least two thousand years (Hall 1984), and fire is considered to be of major importance in the evolution and maintenance of both plant and animal

populations (Bigalke and William 1984; Frost 1984; Hall 1984; Kruger 1984 and Bainbridge 1987). The season and periodicity of fires is a major determinant of species composition and structure of the vegetation (Kruger 1984) and man is the major initiator of fires in southern Africa (Bainbridge 1987). The management objectives relating to the maintenance of genetic and ecological diversity would therefore not be attained in most areas (due to the relatively specific fire treatments required by a large number of species), with a policy of only permitting 'natural' fires in these areas.

In the long term, the natural fire management policy applied in some wilderness areas in South Africa and advocated by Parsons et al. (1986) can only work in very few areas, if at all. This policy needs to be accompanied by intensive monitoring to ensure that species are not lost as a result of the burning treatments occurring in the 'natural' fire regime. Managers therefore need to implement a controlled burning system.

Table 1. Proposed management objectives for wilderness areas.

| <u>Objective</u> | <u>Priority</u> ¹ |
|-------------------------------------------------------------------------------|------------------------------|
| Maintain sample ecosystems in natural state | 1 |
| Maintain ecological diversity and environmental regulation | 1 |
| Conserve genetic resources | 1 |
| Provide education, research and environmental monitoring | 1 |
| Conserve watershed condition | 1 |
| Provide specific resource based wilderness recreation | 1 |
| Protect scenic beauty | 1 |
| Provide for a sustained use of animal and plant products | 3 |
| Protect sites and objects of cultural, historical and archaeological heritage | 1 |
| Stimulate rational, sustainable use of marginal areas and rural development | 1 |

¹ 1 = Primary objective for management of area and resource.
 2 = Not necessarily primary, but always included as an important objective
 3 = Included as an objective where applicable and whenever resources and other management objectives permit.

Vegetation can be significantly affected by herbivore populations (Crawley 1983), particularly in the savanna areas of southern Africa where herbivore biomass is high (Botkin 1984). Animal populations therefore need to be managed to ensure that the objectives of maintaining species diversity in the plant and animal populations are achieved (Botkin 1984; Diamond 1984; Soule 1984 and Petrides 1979). This management may mean no culling, as recommended for the Serengeti (Sinclair 1979), but again, in areas where there are large populations of ungulates, this will only be possible in very few areas, and will need to be accompanied by intensive monitoring.

Although visitor usage is relatively low within wilderness areas, plant and animal populations, and particularly rare species, may be significantly damaged by visitors (Hamilton and Lassoie 1985). Visitor management is therefore essential.

Most wilderness areas are too small, or occupy areas where natural systems are generally influenced by man (outside the control of the wilderness manager), to be able to fulfill their conservation functions in the long term, without active management by man. Management is therefore essential, though it may mean no direct intervention in the ecological processes for long periods of time.

PROPOSED STRATEGY FOR HABITAT MANAGEMENT

Formulation of clear management objectives and goals

It is essential that the management system is based on a set of clearly defined goals and objectives, which should be presented in the form of a detailed policy statement. It is suggested that the management objectives presented in Table 1, which are based on the World Conservation Strategy and MacKinnon & Mackinnon (1986), and agree with those proposed by Bainbridge (1987), should form the basis for this statement.

Information system planning

Wilderness managers in southern Africa are faced with a vast array of data, from a wide variety of sources, and traditional manual systems are not capable of storing, processing and retrieving the information required, efficiently, with the limited resources available. The advent of cheap, powerful, micro-computers has however revolutionized information management. Sound planning and information management is essential to ensure that information can be used effectively to aid in the decision-making process. Data from wilderness areas commonly consists of two components: the actual object or environmental characteristic, and its spatial location. A system specifically designed to store, analyze and retrieve locational and attribute data is usually referred to as a Geographic Information System and differs markedly in concept from the more usual management oriented information systems (Musto & Stubbs 1984), although the general principles are the same. Guidelines for the planning and use of information systems, including geographic information systems, are provided in King (1978), Carlson (1979), Kessell (1979), Myers & Shelton (1980), Tricker (1982), Musto & Stubbs (1984), Myers & Margules (1984), Davis & Olson (1985), Mercer (1986) and Smith et al. (1987).

Inventory and description of the natural system

A formal systems analysis approach together with ecological modeling (Mesarovic 1964; Perraton & Baxter 1974; Van Dyne 1974; Hall & Day 1977; Halfon 1979; Savia & Robertson 1979; Biswas 1982; Kitching 1983; Lavenroth et al. 1983 and Starfield & Bleloch 1986) is essential to provide the framework for the inventory of the natural system. Due to the inherent complexity of ecological relationships, the variability of living organisms, and the apparently unpredictable effects of man's intervention in the natural system, the ecologist requires an orderly and logical representation of the underlying relationships, for an understanding of the system (Jeffers 1982). To achieve this representation the use of ecological models is essential.

All management decisions are based on a model (often in the mind of the manager or researcher) as to what the consequences of a proposed action will be on the system. Therefore, the question is not whether we should use models, but what type of models to use (Biswas 1982). The purpose of ecological modeling, in the management context, is therefore to provide a formal structure for the expression of the system so that:

- (1) Knowledge of the system can be expressed in a concise and easily interpretable manner.
- (2) Gaps in knowledge of individual components of the system and of system function as a whole can be identified.
- (3) Attention is focused on the whole system and the driving forces, as well as the individual components and
- (4) Predictions can be made about the consequences of certain management actions.

Guidelines on the use of systems ecology and modeling for this purpose are provided by Maki and Tompson (1973), Van Dyne (1974), Kessel (1979), Jeffers (1982) and Starfield & Bleloch (1986). Useful system models have been produced for Serengeti in Tanzania (Sinclair & Norton-Griffiths 1979), the fynbos systems in South Africa (Kruger et al. 1985) and the Gorongosa ecosystem in Mozambique (Tinley 1977), while models for the management of fire are being used in the South African wilderness areas (Everson et al. in prep).

The first stage in the inventory is to gather all the available information on the wilderness area and to build a series of models of different components of the system, and the system as a whole. Using the ecological models, the management objectives, and a knowledge of the practical limitations of what the manager can achieve, information requirements are identified using an analysis of information requirements. Strategies are then formulated to gather and store the data in the most effective manner. A useful discussion of the inventory system is given in Myers & Shelton (1980) and Myers & Margules (1984).

In order to ensure that inventories are cost effective, we need to make optimal use of all available human resources, as well as sound measurement and statistical techniques. Tribal people who have a good knowledge of the natural system surround many of the southern African wilderness areas. These people, who require minimal training, can be employed to provide reliable records of species locality and behavior. All management staff should be required to contribute to the inventory process.

Remote sensing is usually the most cost-effective way of determining and monitoring large scale vegetation patterns. SPOT satellite imagery appears to be appropriate as high resolution, rectified, contact prints can be bought and used much the same way as aerial photographs. This avoids the high cost and relatively large systems required for image processing of the raw digital data.

The ecological inventory process is ongoing. At regular intervals the inventory information is used to refine old models and develop new models for the system, as well as to identify new information requirements.

KEY SPECIES

The manager is faced with a large number of species in most of the southern African wilderness areas and some sifting process is required to provide a focus for management.

Key species are defined as those species which play a major role in the achievement of the management objectives. They are not indicator species as such, but provide management with an indication of the relative importance of species. Key species are defined in the following categories:

- (1) Species which are important for the maintenance of species diversity on an international and national basis.
- (2) Plant species which provide food and shelter for animal species.
- (3) Plant species which play an important role in the maintenance of stability of the system.

- (4) Species which play an important role in the ecological processes within the system.

In management for the maintenance of species diversity the status of each rare species needs to be critically examined. Ecological gradients that the species is responding to within the continent need to be evaluated, using gradient techniques (Kessel 1979, Gauch 1982 & Whittaker 1982). If it is found that the species is at the end of its ecological range in a particular area then, in many instances, it would be better to concentrate conservation efforts for that species in another natural area.

Define management prescriptions and actions

Traditionally, management prescriptions were based on the best knowledge available to the manager. Each management prescription is derived from a hierarchical series of assumptions and decisions, starting at the management objective and ending at the management action. In most cases, however, the assumptions regarding each step and the steps taken to reach the final decision are not documented and are mostly carried out in the mind of the manager concerned, with all the inherent problems associated with human thinking (De Bono 1973). This is an inefficient system.

All management decisions are based on a knowledge base. With the increasing quantity and complexity of the information that the manager has to deal with, it is impossible to effectively store and use information in the knowledge base by using the human mind and manual systems alone. With micro-computers and relevant software it is possible to computerize the knowledge base to provide a powerful tool to assist the manager. The knowledge base is usually computerized in the form of an expert system (Starfield and Bleloch 1986).

The knowledge base consists of a decision list (which provides a series of alternative options), a list of questions with answers (which provides the information needed to solve problems) and a list of rules (which describes how one progresses from the answers to the

decisions) (Starfield & Bleloch 1986). Both the questions and the rules should have explanations that help us understand the reasoning behind the knowledge base (Starfield & Bleloch 1986). The knowledge base provides a formal framework for critical evaluation of existing knowledge. Good background to the building of qualitative models, including expert systems can be found in Hayes-Roth et al. (1983), Naylor (1983), Hayes-Roth (1984), Davis & Nanninga (1985) and Waterman (1986).

It is suggested that the formulation of management prescriptions should follow a formal procedure. The first stage is to start with a management objective, and a management goal, then using the ecosystem mode and knowledge base (via an expert system), the alternatives need to be defined, and finally an action decided upon. The steps taken to reach the decision and the areas where further information is required are noted. This process is used in order to refine the knowledge base from monitoring the results of management actions.

The most effective way of using a knowledge base is to incorporate it into an expert system which is geographically referenced and includes quantitative models (in which mathematical models of the system) and qualitative models (rules from the knowledge base) (Davis and Nanninga 1975) to provide:

- (1) Suggested actions based on a set of objectives and goals and
- (2) Statements of the consequences of various alternative management actions on the system.

Monitoring

A formal procedure has been established to determine the management actions required. The manager now needs to determine the consequences of his management actions, and whether the management objectives and goals are being achieved. This is one of the most important steps in the scientific management process and needs to be given adequate attention. Monitoring procedures need to be defined to evaluate what the consequences of a

particular action were (and the action may be not to do anything) in relation to the management objectives and goals. This knowledge is then used to update the knowledge base and the ecosystem models. Again cost-effective monitoring techniques are essential.

CONCLUSIONS

First World management strategies based on large staff and personnel outlays are inappropriate for most wilderness areas in southern Africa. A management strategy based on sound scientific principles, using the latest appropriate technology and the available human resources provides the most effective solution. It is suggested that computer technology provides the tools for effective management for third world situations in that relatively small investments in training and equipment (using software already available) are likely to result in substantial rewards.

Specific expertise, outside the traditional nature conservation field, is needed in such key areas as:

- (1) Information management,
- (2) Limited computer management skills and
- (3) General business management.

Specific technical advice can be provided by consultants, although assistance should be provided on key issues by the international wilderness community in the interests of worldwide conservation.

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FOREST PROTECTION IN WILDERNESS MANAGEMENT: THE SOUTHERN PINE BEETLE AND THE RED-COCKADED WOODPECKER*

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ABSTRACT

The southern pine beetle, *Dendroctonus frontalis*, has the potential to destroy Red-cockaded Woodpecker, *Picoides borealis*, habitat. The potential for interaction of the Red-cockaded and subsequent control actions for the southern pine beetle are outlined in the Final Environmental Impact Statement and Record of Decision for control of the southern pine beetle. Alternative 4, the preferred alternative, includes sections on control of the southern pine in wilderness areas, specifically to protect Red-cockaded Woodpecker colonies and foraging areas. The recent southern pine beetle outbreak and subsequent fire in the Kisatchie Hills Wilderness Area, Kisatchie National Forest, and its impact on the Red-cockaded woodpecker are chronicled as are events in the RARE II Four Notch area of East Texas. The use of SPB hazard and risk rating is suggested as a method of identifying potential threats to Red-cockaded Woodpecker colonies by the southern pine beetle.

The USDA Forest Service recently released the Final Environmental Impact (EIS) statement and subsequent Record of Decision for management of the southern pine beetle (SPB), *Dendroctonus frontalis*, on national forests in the southern United States (USDA Forest Service 1987). This document includes management guidelines for the southern pine beetle in wilderness areas, including areas in and adjacent to colonies of the endangered Red-cockaded Woodpecker (RCW), *Picoides*

borealis. Recommendations include the preparation of a site-specific analysis for evaluation of each southern pine beetle infestation that may impact the Red-cockaded colony and foraging area.

The final Record of Decision identifies alternative 4 as the one selected for implementation for suppressing the southern pine beetle. This alternative includes action in wilderness areas to protect essential RCW colony sites and foraging areas, and adjacent State, Private and high-value Federal lands. Integrated Pest Management will be employed in general forest stands.

WILDERNESS AREAS

In wilderness areas having known RCW colonies, the SPB would be allowed to run their natural course until an essential occupied colony site and foraging area or one that was occupied during the previous breeding season and/or adjacent state, private and high value federal lands is threatened. An essential colony is defined as one needed to recover the species. In the EIS, the area to be protected includes cavity trees, colony protection area and foraging areas, totaling 125 acres (50 ha) per colony. Actions taken include frequent surveillance to locate new spots or breakouts from treated spots, ground checks and collection of data necessary for spot-growth simulation. The biological evaluation would include a prediction for the potential for spot expansion.

If spot-growth predictions show an essential RCW colony (including foraging area) would not be adversely affected, SPB's would be allowed to run their natural course. Monitoring would continue until a spot goes inactive or is no longer considered a threat to

*in Krumpke, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

an essential RCW colony and foraging area inside and outside the wilderness area.

Control would normally begin if the biological evaluation predicts the spot would infest trees within an essential RCW or foraging area within the next 30 days. Before any spots were controlled in wilderness, further site specific analyses would be completed. This includes determination of the intensity and extent of the beetle activity, resources available to control the beetle and a reasonable expectation to protect the RCW. A no-control decision would require informal and, if necessary, formal consultation with the U.S. Fish and Wildlife Service under Section 7 of the Endangered Species Act (1984).

Practical control measures having the least impact on wilderness include:

1. cut and remove by helicopter;
2. cut and leave;
3. cut and remove by animal (skid infested trees out of wilderness using animals; use when next to existing public roads or roads outside the wilderness boundaries; and
4. cut and hand spray spots of 100 or less active trees with lindane or chlorpyrifos.

Extenuating circumstances may necessitate the use of motorized vehicles to protect colony sites. However, this requires approval in advance by the Regional Forester.

In addition to RCW colonies, land would be protected including all state, privately-owned, and high-value Federal lands with susceptible host types. Examples of high-value resources include administrative sites, developed recreation areas, tree seed orchards and progeny test sites. For control actions to be taken, 1) the SPB spot must be within 1/4 mile of state, private or high value federal areas; and 2) biological evaluation predicts it would expand onto that property and cause unacceptable damage to the resource of these lands. A no-control decision would require an informal, or if necessary, a formal consultation with the U.S. Fish and Wildlife Service only when RCW are present.

The preparation of the EIS was prompted by information gathered since the 1974 U.S. Forest Service EIS, "Strategy for control of Southern Pine Beetle in the Southeastern United States" and two lawsuits challenging SPB control in wilderness. Control activity in wilderness was preceded in each forest by environmental assessments (EAS) analyzing the effects of control on each wilderness. The Forest Service decisions to enter the wilderness have been challenged by the Sierra Club, The Wilderness Society and, in Texas, the Texas Committee on Natural Resources.

The rationale for decision to implement Alternative 4 is outlined in the Record of Decision (p. 14, section V). The following laws pertain to action taken under the alternative implemented:

1. The Cooperative Forestry Assistance Act. 16 U.S.C. 2101, et seq.
2. The National Environmental Policy Act. 42 U.S.C. 4321, et seq.
3. The Federal Insecticide, Fungicide, and Rodenticide Act, as amended. 7 U.S.C. 136, et seq.
4. The Wilderness Act. 16 U.S.C. 1131, et seq.
5. The Endangered Species Act. 16 U.S.C. 1531, et seq.
6. The Multiple-Use Sustained Yield Act, 16 U.S.C. 528, et seq.

HAZARD AND RISK RATING OF RED-COCKADED WOODPECKER COLONIES

To ascertain potential stand risk and hazard to SPB outbreaks, hazard rating and risk rating systems may be employed using aerial photography and stand measurements within an area. On national forests in Texas, Smith and Nettleton (1986) documented acres of high, medium and low hazard by ranger district. High hazard stands are those with loblolly or shortleaf pine as the predominant cover type, classified as saw timber, yield at least 800 board feet per acre (Scribner rule) and site index of 90 or greater. This information is available on the Continuous Inventory of Stand Conditions (CISC) automatic data processing system that provides a current

description of timber stands in compartments of National Forests in the Southern United States.

An alternative to the Lorio and Sommers (1981) system is one developed by Mason et al. (1981) using pine basal area and average height of pine derived from aerial photography and landform from topographic maps. A predetermined area (50.6 ha as indicated in the Red-cockaded Woodpecker recovery plan, U.S. Forest Service 1985) can be hazard rated and the hazard classes used as guidelines for management alternatives as outlined in the EIS and the subsequent ROD. Mitchell (1987) demonstrated this method around Red-cockaded colonies on the U.S. Forest Service Bannister Wildlife Management Unit on the Angelina National Forest in Texas. Around seven colonies in the loblolly/shortleaf pine type, Mitchell found 11 percent of the area in extreme hazard class in 1982 and 7.5 percent in 1986. Although remedial action is not practiced in wilderness areas, guidelines for management, including use of southern pine beetle spot growth models, interfaced with a computer-based decision support system (Southern Pine Beetle Decision Support System) may enable the forest manager to make the best decision concerning control action in and adjacent to Red-cockaded Woodpecker colonies in wilderness areas. This method is being used in current southern pine beetle infestations in National Forests in Texas.

IMPACT OF THE SOUTHERN PINE BEETLE ON RED-COCKADED WOODPECKER POPULATIONS

The potential impact of the southern pine beetle on Red-cockaded Woodpecker colonies is evident from recent events in the Kisatchie Hills Wilderness on the Kisatchie National Forest in central Louisiana. Although considerable literature exists on the Red-cockaded Woodpecker (Jackson 1981), an intensive review of the literature revealed little investigations concerning interaction between Red-cockaded Woodpeckers and southern pine beetles.

The southern pine beetle epidemic in Louisiana created significant ecological changes in forest composition and structure on the

Kisatchie National Forest. By March 15, 1986, 13,294 ha of pine on the Kisatchie National Forest was infested by the southern pine beetle. By preliminary estimates, the infested area represented ten percent of the acreage of yellow and longleaf pine forest types greater than 11 years old (USDA 1985). In attempts to control beetle expansion in the National Forest 11,676 ha of infested pine were treated with either cut-and-leave (3,971 ha), or cut-and-salvage (7,705 ha) operations. In addition to treated areas, 635 ha of pines were left standing after determining that the beetles had vacated the trees. These vacated trees have created "islands" of standing snags, which range in size from 0.2 to 80 ha.

The impact of the southern pine beetle in the Kisatchie Hills Wilderness Area on the Kisatchie Ranger District was particularly serious. By January 13, 1986, 1,571 ha of the 3,523 ha wilderness area had been impacted by the southern pine beetle. Control of infestations in the wilderness area was limited to the cut-and-leave method. Control activities required felling all pine trees on 1,336 hectares. Prior to initiation of control efforts the beetle had infested and vacated 235 ha of pine, which was not cut, creating numerous islands of standing snags. Approximately 35 to 40 percent of the cut-and-leave areas occurred in mixed pine-hardwood habitats while the remainder was either longleaf pine or loblolly pine stands.

Felling the pines in the mixed pine-hardwood areas created residual stands dominated by hardwood species. Total basal areas in these stands ranged from 1.13 to 2.26 m²/ha, while the dominant trees range between 30.4 and 40.6 cm at dbh. Although a variety of hardwoods remain in the cut-and-leave areas, several species including white oak (*Quercus alba*), southern red oak (*Q. falcata*), swamp chestnut oak (*Q. michauxii*), post oak (*Q. stellata*), blackjack oak (*Q. marilandica*), bluejack oak (*Q. incana*), hickory (*Carya*), sweetgum (*Liquidambar styraciflua*) and American beech (*Fagus grandifolia*) comprise the majority of the stocking. Cut-and-leave operations in the pine types resulted in stands similar in appearance to final harvest regeneration areas, except that the felled trees remain on the ground. The long term effects of

these habitat changes on the red-cockaded colonies within the Kisatchie Hills Wilderness Area are currently unknown.

Field surveys identified 20 red-cockaded colony sites within the wilderness area. Status of these colonies was determined following methods described by Jackson (1977). By March 26, 1986, 12 colonies were active, seven inactive and one destroyed. Based on past colony data, recent colony surveys and the proximity of beetle infestations or control activities, four of the seven inactive colonies were inactive prior to the beetle outbreak, two of the three remaining inactive colonies were active in May 1985, while the status of the other inactive colony prior to the beetle control activity was unknown. The destroyed colony was active prior to the beetle outbreak. The cavity trees of this colony were infested and subsequently killed by beetles in March 1985.

Although colony abandonment can be documented for three colonies in the wilderness area since the beetle outbreak began, beetle control activities may have been responsible for protecting several active colonies from possible beetle infestation.

One colony, KHW #8, containing five cavity trees, all longleaf pine, is located in the northeast portion of the Kisatchie Hills Wilderness Area in Natchitoches Parish, Louisiana. The elevation is approximately 91 meters above mean sea level, soil series is Kisatchie (Soil Conservation Service), forest type is predominantly longleaf pine and the basal area averages 1.90 m²/ha, with a diameter (at 1.4m) range from 38.9 cm to 45.5 cm.

The colony site was selected since it is unique in many respects, to other active colonies within the wilderness area. Between January 15 and June 23, 1985, 18 beetle spots, ranging in size from 0.1 ha to 14 ha, within 400 m of the colony were treated. Control efforts prevented infestation of the cavity trees but resulted in the isolation of trees in a 10 ha stand, hereafter called the "colony stand", of remaining longleaf pine. Four of the five cavity trees lie immediately adjacent to a cut-and-leave area approximately 1200 ha in size. The colony

stand is separated from adjacent remaining pine stands by cut-and-leave areas ranging in width from 100 m to over 1400 m. Three loblolly snag "islands" occur within 200 m, 450 m and 1030 m of the cavity trees. Several stands of residual hardwoods in the cut-and-leave areas occur within 700 m of the cavity trees. The surrounding habitat, with the exception of the colony stand, within 1200 m of the cavity trees, is a bottomland pine-hardwood type dominated by large (45.7 to 71.1 cm dbh) loblolly pine in association with scattered white, southern red and swamp chestnut oaks.

Colony stand KHW #8 was first observed on May 14, 1985 at which time all cavity trees were mapped and classified. Four of the five trees contained at least one active cavity of "start hole." Observations throughout the subsequent summer and fall continued to confirm that the birds were using the cavity trees. During initial trips to the colony stand the Red-cockaded were observed foraging on pine snags and hardwoods.

On survey days the two bird clan was followed, using the dawn to dusk tracking technique, from the time they exited their cavities in the morning until they returned that evening. All foraging behavior and cavity tree maintenance was documented, and measured using digital stop watches, rounding time to the whole minute. The location of the birds was plotted on a 1:24,000 USGS topographic map throughout the day based on their movements. Their home range was determined by connecting the maximum peripheral points and calculating the area within the polygon.

HOME RANGE

The calculated home range of KHW clan #8 was 63.9 ha. Although some studies (Crosby 1971, Skorupa and McFarlane 1976, and Sherrill and Case 1980) documented home ranges and territories considerably less than KHW clan #8, other researchers using the dawn to dusk tracking technique documented similar home ranges. Baker (1971), studying one clan in Florida, determined the maximum area utilized was 65.6 ha. Nesbitt et al. (1978), using radio telemetry techniques with three clans in Florida calculated an average fall range size

of 69.8 ha. Hooper et al. (1982), working with 24 clans in South Carolina calculated an average year-round home range of 70.3 ha. the average annual territory size for six clans in South Carolina, based on continuous seven-hour tracking periods beginning when birds left the cavity trees in the morning, was 68.8 ha (Wood et al. 1985). Home range size is perhaps the only similarity between KHW clan #8 and other Red-cockaded clans thus far investigated.

The 69.3 ha home range of KHW clan #8 contains 10 ha (14%) of longleaf pine, 26 ha (37%) of loblolly pine-mixed oak, 29.3 ha (43%) of cut-and-leave area and 4 ha (6%) of snag islands. Thus, only 51% of the documented home range contains live pine trees. the remaining 49% contains two relatively large (12 ha and 18 ha) cut-and-leave areas, separated by the 10 ha colony stand, and three small (0.5 ha, 1.0 ha and 2.5 ha) snag islands. Observations indicated that the birds foraged in particular habitat types within their home range, disproportionately to habitat availability. The clan spent 47% of their time foraging in the 26 ha stand of large, mature loblolly pine-mixed oak. Except for two periods in which the birds foraged in white oak, all foraging was in loblolly pine.

Foraging in the cut-and-leave areas of the home range accounted for 11% of total foraging time. Although 30 ha of the home range is cut-and-leave area, only three small areas, totaling 7 ha (23%), were selected for foraging. These three areas contained residual hardwoods, while the remainder of the cut-and-leave areas have few or no standing trees. White oak was the preferred foraging species in the residual hardwood areas, although the birds foraged briefly in sweetgum. The 10 ha colony stand, containing all the longleaf pine habitat in the home range, was not an important foraging area for the clan. The birds spent 18% of their time in the colony stand; however, only 7% of this time was spent foraging, while the remaining 11% was used for cavity tree excavation and cavity maintenance.

Unlike the longleaf habitat, the three loblolly snag islands were important foraging sites for the clan. The birds spent 35% of their

total foraging time in the 6% of their home range occupied by snag areas. Preliminary observations suggest that foraging behavior in the snags differed fundamentally from foraging patterns in living trees. Foraging in live pines and white oak involved considerable mobility between trees and throughout individual trees. The birds moved continuously when foraging on the trunk and limbs of live trees. In contrast, foraging in snags in a 0.5 m area for 59 minutes on 62 minutes respectively. Several factors, including the foraging substrate and natural prey abundance may contribute to this behavior.

The birds easily removed the layers of bark of snags that had been dead for eight months. This exfoliation of bark presumably exposed different species and stages of prey species in quantities probably not found in the tight, healthy bark of living trees, thus reducing the need for constant mobility while foraging. Moser et al. (1971), identified 96 species of insects in tree sections removed from loblolly pines infested by the southern pine beetle in East Texas. This type of prey diversity is not only important to Red-cockaded Woodpeckers, but also to other woodpecker species, including downy (*Picoides pubescens*), hairy (*P. villosus*), Red-bellied (*Centurus carolinus*) and pileated (*Dryocopus pileatus*). All of these other species were observed foraging in the snag areas. Hairy and Red-bellied woodpeckers were common foraging associates of the Red-cockadeds, frequently foraging in the same or immediately adjacent snags. The importance of the snags as foraging habitat for the Red-cockadeds will likely diminish as the snags age and eventually lose their bark. The impact of the changing conditions of snags on the birds' ability to acquire sufficient types and amounts of food within their existing home range is currently unknown.

Based on the preliminary observations of KHW clan #8, three important factors that were identified should be considered during southern pine beetle control activities in and adjacent to Red-cockaded Woodpecker home ranges. First, and undoubtedly most important, is to save the cavity tree(s) and as much of the associated colony stand as possible. Ligon (1970) suggested that the most important aspect of the

Red-cockaded's life was the roost tree. Wood et al. (1985) investigating even-aged timber management and Red-cockaded's stressed the importance of providing "for the integrity of the existing colony stands."

Second, Costa and Hogan indicated that pine trees infested, killed and then vacated by southern pine beetles create valuable foraging habitat for the Red-cockaded Woodpecker. The majority of the snags KHW clan #8 foraged were infested by beetles eight months prior to our observations. In wilderness areas, within 1320 m of colony stands pine trees infested and subsequently vacated by southern pine beetle should not be cut and left or cut and removed.

Finally, we observed Red-cockaded's flying as far as 700 m from adjacent pine stands into the cut-and-leave areas to forage in white oak. We recommend that during beetle control activities in wilderness areas, within 880 m of colony stands, white oak and other hardwoods with bark characteristics similar to pines be retained.

RARE II FOUR NOTCH

In Texas on the Raven Ranger District of the U.S. Forest Service Sam Houston National Forest, Billings and Varner (1986) chronicled a severe southern pine beetle outbreak on the Four Notch Further Planning Area. This area was considered for wilderness designation under RARE II but was subsequently dropped following the southern pine beetle outbreak covering 1512 ha (55% of the Four Notch Further Planning Area). Within the Four Notch Area, five of the 12 known Red-cockaded Woodpecker colonies were infested by SPB and abandoned. This event underscores the importance of prompt and timely response for protection of Red-cockaded Woodpecker colonies on federal land as outlined in the final EIS and the subsequent Record of Decision.

As many of the wilderness areas, especially in Texas, contain large areas of mature pine stands (Smith and Nettleton 1986), sudden disturbances (i.e. hurricanes, multiple lightning strikes) can rapidly alter the landscape, thus reducing both the pine type and also Red-

cockaded Woodpecker colonies. Coulson et al. (1986) outlines this process in reference to the Four Notch. When the area was proposed for wilderness designation, the landscape was vegetated primarily by mixed loblolly and shortleaf pines 50+ years old. Coulson described this area as a nonequilibrium landscape based on properties from Shugart (1984). Subsequently, the area was the focus of a massive disturbance leading to excessive herbivory by the southern pine beetle (i.e. massive in the sense that the scale of the disturbance and the scale of the landscape set aside were the same). As Coulson notes, the specific attributes associated with the landscape used in site selection were completely lost as a result of the disturbance. Billings and Varner (1986) further detail events in the Four Notch, including helicopter removal of timber and a chronicle of the outbreak. Coulson et al. (1986) proffer three conclusions: 1) recreationists might view the loss of attributes associated with old-growth pine as catastrophic; 2) forest ecologists could observe the operation of ecosystem level processes in action; and, 3) the forest manager might bemoan the loss of the resource. Another potential outcome of excessive herbivory by bark beetles is the increase in the fuel load; this may lead to fuel reduction (forest fire).

Such was the case following the southern pine beetle outbreak in the Kitatchie Hills Wilderness Area. Following the bark beetle epidemic, a forest fire burned approximately 3900 ha within the wilderness and was finally checked at the wilderness boundary by backfires, firelines and roads. During the fire, cavity trees of the Red-cockaded Woodpecker were lost and the subsequent effects are being further assessed. However, as Jackson et al. (1986) explains, fires in Red-cockaded Woodpecker colonies are not always injurious and may in fact be beneficial.

CONCLUSIONS

The potential for the interaction of the southern pine beetle and the Red-cockaded Woodpecker are demonstrated by the recent southern pine beetle outbreak and subsequent fire in the Kisatchie Hill Wilderness Area. Catastrophic events (hurricanes, tornadoes,

multiple lightning strikes) may result in extreme changes in the landscape. The Final Environmental Impact Statement and subsequent Record of Decision outline methods for managing the southern pine beetle, including protection of essential Red-cockaded Woodpecker colonies in wilderness. Additional considerations in wilderness and non-wilderness areas include the management use of fire and the absence of hardwood midstory in Red-cockaded Woodpecker colonies (Jackson et al. 1986). The complex issue of southern pine beetle control and endangered species creates incredible challenges for managers (Kulhavy et al. 1986). Any management solution, however, must be tempered by the initial intent of wilderness legislation and the concept of "minimum tool use."

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THE EFFECTS OF WILDERNESS RECREATION ON AVIAN SPECIES RICHNESS IN THE EAGLE CAP WILDERNESS AREA, NORTHEASTERN OREGON*

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ABSTRACT

The increasing amount of recreational use in our wilderness areas has necessitated the implementation of sensitive and reliable monitoring systems to assess the ecological impacts of wilderness recreation. While bird species have been useful in monitoring extreme environmental impacts, we found that bird species could be used to successfully monitor the relatively subtle impacts of wilderness recreation. Bird species richness (number of species) was compared between campsite, trail sites and control sites in a heavily used area of the Eagle Cap Wilderness in northeastern Oregon. Species richness declined 21.2% on trail sites ($p=0.06$), and 30.3 % on campsites ($p=0.01$) relative to control sites. These declines were attributed to changes in vegetation as well as the presence of people. Bird species richness provided a simple, quantifiable indicator with which one can monitor changes in wildlife due to recreation, and can aid in establishing meaningful and verifiable limits of acceptable change.

INTRODUCTION

The Wilderness Act of 1964 states that wilderness areas are to be protected and managed to preserve them in their natural condition, untrammelled by man. However, two-thirds of the wilderness managers surveyed in 1980 reported excessive impacts to vegetation and soil on campsites and trails (Washburn and Cole 1983). As wilderness use continues to

increase, impacts will increase unless we can reduce them through proper management and education. Proper management should include an effective monitoring program, which requires indicators that are quantifiable, sensitive to changes and responsive to management.

While many studies have been done on the impacts of recreation on soil and vegetation (Cole and Schreiner 1981), very few have sought to quantify the impacts on wildlife (Boyle and Samson 1985). Wildlife species can be excellent indicators because of their sensitivity to environmental change (Whiting, et al. 1983, Steele, et al. 1984). While many species are difficult or expensive to monitor, bird species are ideal indicators because they are 1) sensitive to habitat induced stress, 2) conspicuous by sight and sound, 3) easy to recognize in the field without having to capture them, and 4) active during the hours when people are active (Szaro and Balda 1982). The few recreation studies that have used bird species have dealt with the effects of recreational use in developed campgrounds and suburban parks on bird communities (Foin, et al. 1977, Aitchison 1977, van der Zande and Vos 1984, van der Zande, et al. 1984). These studies found changes in species density and richness resulting from habitat disturbance and the presence of recreationists.

In order to find out if a bird community would also be affected by recreational use in a wilderness setting and therefore useful in a wilderness monitoring program, we surveyed bird species richness (number of species) on campsites, trail sites and control sites in the lakes basin region of the Eagle Cap Wilderness area. For monitoring purposes, it is essential that the data which is collected be reliable, especially when it might be collected by

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different individuals from year to year. Species richness was surveyed because of its simplicity and precision (Verner 1985). Although species diversity has been used in other bird studies, species richness is highly correlated (Tramer 1969), easier to measure and less prone to error especially in areas with dense undergrowth or highly mobile species (Verner 1985).

Since birds are directly influenced by vegetation (MacArthur, et al. 1962), the canopy and understory were measured to characterize the vegetation at each site. Percent canopy cover was used as an indicator of similarity between test and control sites, while understory vegetation was measured to characterize changes in vegetation due to recreational use.

MATERIALS AND METHODS

Seven, heavily used backcountry campsites, as determined by a visual rating, (Frissell, 1978) were selected in the lakes basin area of the Eagle Cap Wilderness. For each of the seven campsites, a corresponding trail site and control site were chosen within the same locality (120-240 meters), and within the same vegetation community subtype (described by Cole, 1982). Each campsite and its corresponding trail site and control site represented a block.

Canopy cover was determined for each site by using a spherical densiometer (Lemmon 1956). Readings were taken in the four cardinal directions, then averaged to determine an overall canopy cover value for each site. Understory cover was estimated using a 2x5 decimeter plot frame according to Daubenmire (1959). Plots were laid out along transects at one and three meter intervals. Two perpendicular transects intersecting in the center of the site were used on campsites and controls while only one transect was laid out perpendicular to the trail on trail sites (Foin, et al. 1977). The understory values were averaged to give an overall value for each site.

Sites within blocks were surveyed for bird species consecutively to reduce differences caused by time of day. Each block was surveyed three times over the course of the

summer (July-August 1986) to provide replicate values and overall average bird species richness for each site. A statistical analysis of variance for randomized complete block design was used to test the differences in the means for each type of site (Ott 1984)

Surveys were conducted on Friday, Saturday and Sunday mornings for the first three hours after sunrise. A site survey consisted of counting the number of bird species seen or heard for a period of eight minutes (DeSante 1981). Upon arrival at each site, the birds were given one minute to adjust to the presence of the observer(s). Bird species were recorded as being on the site if they were within forty to fifty meters.

RESULTS

The vegetation of the study area was characterized by a mosaic of subalpine forests, meadows and scattered granitic outcrops. *Abies lasiocarpa* dominated the canopy and the understory consisted mainly of *Vaccinium scoparium*. Meadows were dominated by *Cares* species (Cole 1982). The elevation ranged from 2,164 - 2,317 meters (7,100-7,600 feet).

The average canopy cover for each type of site ranged from 34-41% and did not differ significantly ($p=0.27$). Canopy species were the same for all sites within each block. Understory vegetation cover was measured in order to reflect the amount of use each type of site received, and understory cover was found to average 15% on campsites, 54% on trail sites, and 51% on control sites. While trail sites did not show an overall decline in understory vegetation, campsites declined significantly ($p=0.004$) from controls (Ebert 1987).

Nineteen bird species were recorded on the study sites over the course of the summer (July - August 1986). The mean bird species richness for each type of site was 2.19 for campsites, 2.47 for trail sites and 3.14 for control sites which reflected a species decline of 21% on trail sites ($p=0.06$) and 30% on campsites ($p=0.01$) as compared to controls (Figure 1). Ground utilizing species declined on campsites overall, while most of the canopy species showed little

preference for a particular type of site. Exceptions were the Hairy Woodpecker and the Red-breasted Nuthatch. Though both species are cavity nesters and bark gleaners and were not expected to be affected by changes in the understory vegetation, both declined an average of 78% from control sites to campsites (Ebert 1987).

DISCUSSION

One of the major objectives of this study was to determine whether recreational activities affect the bird community in a wilderness setting, therefore making bird species monitoring an effective wilderness management tool. Results indicated that there were differences in bird species richness between the campsites, trail sites and control sites, and that these differences appear to be caused by recreational use. While recreational use may be responsible for changes, it is difficult to determine what aspect of recreation is causing the impact.

Vegetation and habitat have been shown to be directly related to bird community structure (MacArthur, et al. 1962). In turn, recreation has been shown in many areas to have detrimental effects on vegetation cover and composition (Cole and Schreiner 1981, Cole 1986), therefore one would expect bird communities to be affected by recreation. Kilgore (1971) examined the effects of removing brush, saplings, downed trees and other flammable materials from the understory on the bird community in a sequoia forest in California. The impacts were similar to those caused by recreation in that the upper canopy was undisturbed while the ground and understory vegetation were heavily impacted. Kilgore (1971) surveyed birds on treated plots and control plots over a three year period and found that 33% of his species were affected by understory removal, and these were mostly ground feeding species. In this study, we found that 82% of the species declined on campsites, and most but not all were ground utilizing species. Part of this difference can be attributed

Study Areas (blocks)

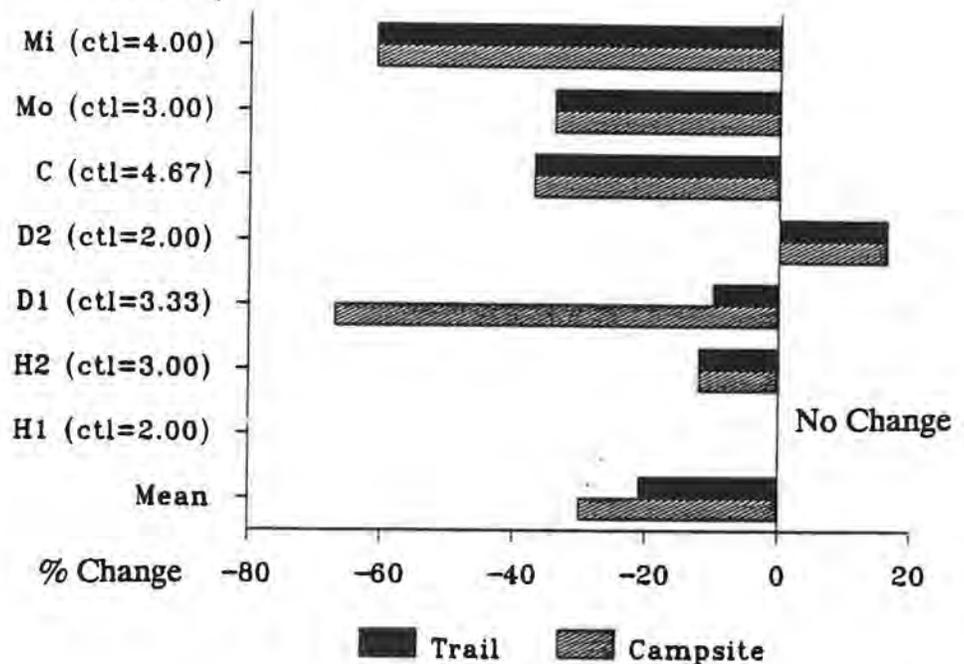


Figure 1. Percent change in species richness relative to respective controls. (ctl= control richness)

to the vegetation community. Kilgore's sequoia forest was more complex and had a greater foliage height diversity, while the subalpine fir community where this study took place consisted of two layers: canopy and understory. It is likely that more birds were dependent upon the understory vegetation in our study because of the simple vegetation community structure, causing a greater percentage of the species to be affected by changes in the understory.

In addition, the presence of people may have been an influencing factor. The understory vegetation was not significantly different between trail sites and control sites ($p=0.744$), yet species richness was different ($p=0.06$) indicating that something in addition to vegetation loss may have been affecting the bird community. Furthermore, two species, the Hairy Woodpecker and Red-breasted Nuthatch, declined an average of 78% on campsites and 14% on trails, yet neither of these species directly relies on the understory vegetation. The dramatic decline of these two species supports the idea that something other than loss of understory vegetation is affecting the bird community.

In other studies (Aitchison 1977, van der Zande, et al. 1984), declines in species richness and diversity have been attributed to the presence of people. For example, Aitchison (1977) compared bird species richness in a developed campground both before and after it was opened for use. In two of the three years surveyed, species richness declined by three or four species in the campground after it was opened. Aitchison hypothesized that the presence of people in the campground directly affected the numbers and kinds of species present.

While the loss of understory vegetation as a result of recreational use affects bird species, changes in species richness also reflect other environmental disturbances. It is likely that the presence of people has a direct effect, through noises, smells and visual impacts though it is difficult to tell to what extent. Other indirect effects, such as changes in microclimate and food resources as a result of soil compaction, must also be considered.

SUMMARY

1. For wilderness management purposes, bird species richness appears to be a useful indicator of environmental change. Species richness is reliable in that it is a simple measurement that can be taken by different individuals from year to year without sacrificing as much precision as one would by measuring other aspects of the population (Verner 1985).

2. Species richness is also easily quantified and could be worked into a Limits of Acceptable Change management scheme (Stankey, et al., 1985). In our study, richness declined an overall 30% on campsites and 21% on trail sites. These percent declines provide meaningful values to managers who must establish limits of change. In other studies, 10% reduction in species diversity has been found to be a problem for species replacement and a 50% decline is considered critical (Severinghaus and Severinghaus, 1982, van der Zande, et al., 1984). While this study only entails the results from one summer, it should alert managers to the fact that wilderness recreation is having an effect on the bird species in the area, and that it needs to be looked at in more depth. If birds are being affected, it is quite likely that other wildlife species are as well.

3. Further studies are needed to determine the extent of the impacted area. Does bird species richness decline only in the limited area around a campsite or is the affected area much larger? When monitoring vegetation, the affected area is immediately around a campsite or trail, whereas monitoring birds may reflect impacts to the surrounding area. Monitoring bird species, as well as vegetation, would enhance a wilderness monitoring program by reflecting not only obvious impacts to the environment such as trampling and loss of vegetation, but also the more subtle impacts such as noises, smells and visual impacts that would affect wildlife.

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WILDERNESS MANAGEMENT: PRINCIPLES, PROCESSES AND PROGRAMS

MANAGING WILDERNESS AS A RESOURCE: BASIC PRINCIPLES

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THE FOREST SERVICE WILDERNESS MANAGEMENT RESEARCH PROGRAM

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MAINTAINING WILDERNESS QUALITY THROUGH THE LIMITS OF ACCEPTABLE CHANGE PLANNING SYSTEM

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WILDERNESS USER STANDARDS OF CAMPSITE IMPACT ACCEPTABILITY

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MONITORING WILDERNESS VISITOR PERCEPTIONS: DEVELOPING LOW-COST SYSTEMS FOR MANAGEMENT

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WILDERNESS MANAGEMENT IN THE SIERRA NEVADA, CALIFORNIA: 23 YEARS OF INTERAGENCY COOPERATION

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NO WILDERNESS MANAGEMENT: PARTNERSHIPS WITH A DIFFERENCE

Judith Lambert, The Wilderness Society

INTERNATIONAL COOPERATION IN FRONTIER REGIONS: THE ABCY REGION CASE STUDY

Glenn T. Gray

INTEGRATING PROTECTION AND USE IN WILDERNESS AREA MANAGEMENT: AN ASSESSMENT OF THE BALI TRAINING MATRIX

R. Graham, University of Waterloo

R.J. Payne, Lakehead University

MANAGING WILDERNESS AS A RESOURCE: BASIC PRINCIPLES*

ED BLOEDEL

" . . . to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." (The Wilderness Act, 1964, emphasis added.)

This one clear statement of purpose from the American Wilderness Act of 1964 is the foundation upon which wilderness management philosophy and policy in the United States is built. Wilderness is managed as a unique and vital resource, producing numerous benefits for the American people.

This paper describes the wilderness resource, presents a model for managing wilderness as a resource and provides 16 basic management principles, all of which are derived from the American Wilderness Act. These concepts and principles have been refined and have effectively guided wilderness management for 23 years.

The best management of any unit of undeveloped land as wilderness occurs when the unit's management direction is based on solid, basic principles. These basic principles, along with specific management practices developed for and tailored to the ecological characteristics of each wilderness, can be applied to any type of wilderness ecosystem in the world.

Wilderness is a unique and vital resource made up of inseparable parts. It is a place people can visit and enjoy without occupying it or modifying it to suit themselves. It is a place where natural ecological processes are in control

and humans are merely visitors. Yet, it is a place where visitors can derive great personal benefits, such as emotional and spiritual renewal, improved self-esteem, improved physical or mental health, and a test of their outdoor living skills. Wilderness is a natural preserve but, at the same time, a place for present and future generations to use and enjoy.

The wilderness resource, as defined in the American Wilderness Act, has three equally important characteristics (The Wilderness Act, 1964):

1. It is a place not controlled by humans, where natural ecosystem processes operate freely and where its primeval character and influence are retained.
2. It is a place not occupied or modified by mankind, where humans are merely visitors and the imprint of their work is hardly noticeable.
3. It is a place with outstanding opportunities for solitude or for a primitive and unconfined recreational experience.

The wilderness resource also is composed of basic natural resources, such as soil, water, wildlife, vegetation, and air to be managed as inseparable parts of the whole—the wilderness resource.

When properly managed, the wilderness resource produces numerous social, cultural, and natural resource benefits for humans. Besides the self-renewing personal benefits mentioned earlier, wilderness produces social benefits such as improved work performance, economic returns, and environmental education. Wilderness produces cultural

*in Krumpke, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Preserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

benefits, such as a tie with our history, improved national character, and a bequest to the future. Wilderness preserves ecological benchmarks for comparison with more manipulative land management practices: A place for species diversity and the preservation of gene pools. The list of human benefits for lands designated as wilderness is long indeed and should be carefully considered when making long-term land management decisions.

The concept of wilderness as a distinct resource is illustrated in Figure 1, The Wilderness Resource.

The citizens of the United States recognized the need for legal protection of the wilderness resource and, through Congress, brought about the Wilderness Act of 1964. The Wilderness Act directs the management of wilderness ecosystems in as natural a condition as possible while providing for human benefits and use. The Act established a National Wilderness Preservation System, which now comprises 465 wildernesses totaling 89 million acres of lands in nearly every state. The system is managed by four Federal Government agencies: The Forest Service in the United States Department of Agriculture, and National Park Service, Bureau of Land Management, and the United States Fish and Wildlife Service in the Department of the Interior. Individual States also have set aside tracts of State Lands to be managed like the Federal Wilderness System.

The System contains a wide variety of natural ecosystems, including deserts, grasslands, mesas, canyonlands, swamps, brushlands, hardwood and conifer forests, and coastal and alpine zones. Because it is so diverse, national management policy is based on principles derived from the Wilderness Act, while allowing management practices to be tailored to each wilderness. At the same time, policy has been kept as consistent as possible to assure meeting the overall purpose of maintaining an "... enduring resource of wilderness."

The concept of managing wilderness as a resource under the American Wilderness Act is illustrated in Figure 2, The Wilderness

Management Model (USDA Forest Service, 1986).

The Wilderness Management Model shows the relationship between the natural, undisturbed purity of a wilderness and the human influence that affects it. The more human influence, the less pure a wilderness is; the less human influence on a wilderness, the more pure the wilderness can be.

In absolute wilderness, there is no human influence preventing the area from retaining its purest natural form. It is unlikely, however, that this condition exists anywhere on earth. There are few places, if any, where humans have neither set foot nor where human influences, such as pollution, have not been felt. The American Wilderness Act defines wilderness as some point below absolute wilderness.

The American Wilderness Act permits certain activities and contains prerogatives that also tend to lessen the opportunities to reach absolute wilderness. Mining is permitted on valid claims; access to valid occupancies and private land is provided for; and fire control, insect and disease control, grazing, and visitor use are permitted within limitations. Considered together, these modifications define minimum legal wilderness.

Each wilderness is affected by a variety of human influences that vary in intensity. In one wilderness, human influence may be very limited; in another, major disturbances occur. The number and intensity of these influences cause a gap between the attainable legal wilderness and the conditions that exist in a wilderness ("X"). Therefore, the overall goal of managing each wilderness is to attain the highest level of purity of its wilderness character within legal constraints. The model illustrates this goal as a management effort to move the wilderness up into the zone between minimum legal and absolute wilderness.

Wilderness management is not resource management "business as usual." This is

Figure 1. The Wilderness Resource ... Producing Social, Cultural and Natural Resource Benefits for Humans

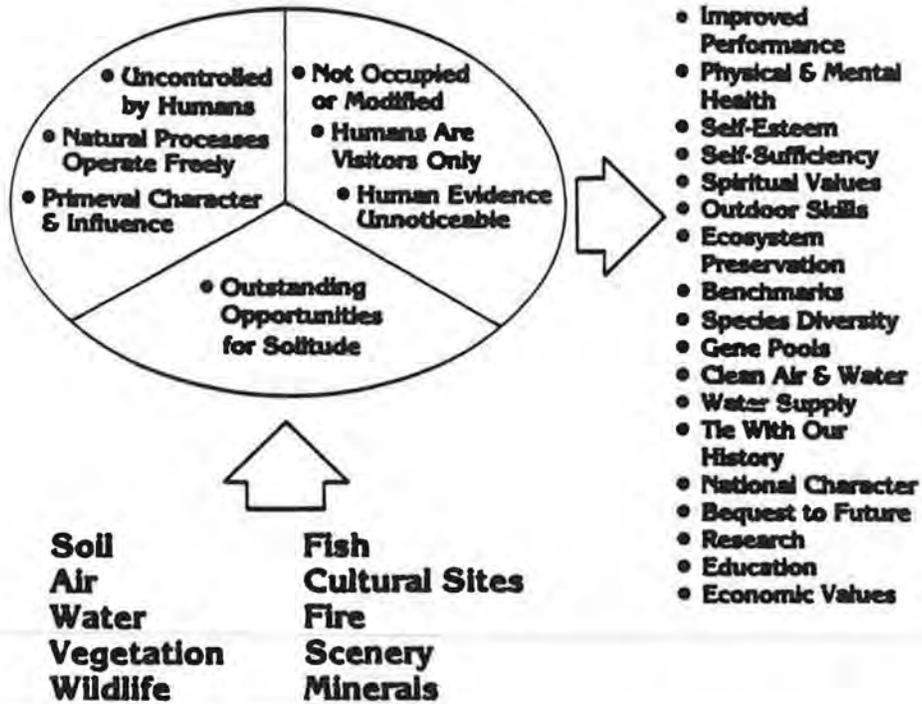
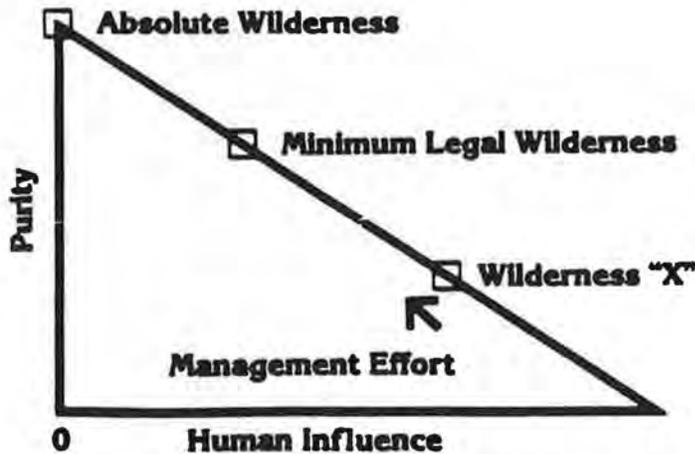


Figure 2

The Wilderness Management Model



perhaps the hardest concept for foresters, biologists, range conservationists, and other resource professionals to understand or accept. It is not "management" in the sense of "doing something," "manipulating," or "improving" and "enhancing" each separate natural resource for maximizing a particular human benefit from those resources. It is preservation of the wilderness resource for humans to enjoy "as wilderness." It is allowing natural processes to operate freely or "protecting" nature's opportunity to "manage" the area without human interference. The word "untrammled" was used in the Act to clearly convey that the wilderness must be kept "uncontrolled" by humans.

To ensure that wilderness is managed and preserved as an "enduring resource," a set of management principles has been derived from the American Wilderness Act. The principles are used to guide the development of specific management objectives and management practices for each wilderness.

To my knowledge, the first list of 11 principles was published in the textbook *Wilderness Management* (Hendee et al. 1978). The Wilderness Society published five principles, which combine many aspects of the earlier list, in their *Wilderness Act Handbook* (The Wilderness Society, 1984).

The following 16 principles derived from the Act have been tested by United States Forest Service Wilderness Managers and have been proven to be effective in ensuring that wilderness is managed as a unique and vital resource:

PRINCIPLES OF WILDERNESS MANAGEMENT

1. Manage wilderness as a distinct resource with inseparable parts.

Wilderness is a unique and vital resource that produces many human benefits. Chief among these benefits is the recognition gained by visiting or reading about wilderness that we are an important part of the continual chain of life that connects us as a society to our past and

future. We must tap into this resource and be continually renewed. We also must recognize our capacity to destroy this chain of life and our responsibility to preserve wilderness and other natural resources for untold generations to come. We are a part of the natural world—not an intrusion in it—and we must contain our urge to "... occupy and modify ..." all corners of the earth, preserving at least a small part of it as "... and enduring resource ..." to enjoy "... as wilderness"

2. Manage the use of other resources and activities within wilderness in a manner compatible with the wilderness resource.

This principle means that the wilderness resource comes first. Managers must ensure that any proposed management actions or activities will not harm the wilderness resource. For example, managers do not manipulate wildlife habitat to improve huntable wildlife numbers. As another example, recreation activities must be managed and kept within levels that maintain the wilderness character of the land and visitor solitude.

3. Allow natural processes to operate freely within wilderness.

This very important principle is at the heart of maintaining a true wilderness—where mankind is not "controlling" the processes. It means truly letting nature perform the managing and manipulation of the vegetation and wildlife species within wilderness. It also means allowing important natural processes such as fire, insects, and disease to play their ecological roles in wilderness as much as possible. In wilderness, these processes are not "destructive"; they are not "good" or "bad" but natural. When allowing natural processes to operate freely, allowances must be made to protect human life or property and to prevent escapes from wilderness.

4. Attain the highest level of purity in wilderness character within legal constraints.

As depicted in Figure 2, this is an overall goal of wilderness management to make it as wild and as natural as possible. This includes

restoring wilderness character when it has been severely damaged by human use. An example is the closing of old roads or restoring severely damaged trails and use sites. Each wilderness is a unique ecosystem, therefore, protection actions must be determined for each.

5. Preserve wilderness air and water quality.

Air and water can be carriers of pollutants that affect the functioning of a wilderness ecosystem. Managers should monitor and report pollution levels and implement other laws specifically designed to protect air and water quality. Internal pollution sources such as animal and human waste also must be controlled.

6. Produce human values and benefits while preserving wilderness character.

Wilderness is for people. It is for people to visit or otherwise use and enjoy ". . . as wilderness . . ." Managers must not get so protective of the ecosystem that they close the opportunity for people to enjoy the wilderness. To some people just knowing it is there is of great benefit. The preservation of ecosystems in their natural condition is a long-term benefit for people.

7. Preserve outstanding opportunities for solitude or a primitive and unconfined recreation experience in each wilderness.

One of the most important human benefits of wilderness is the opportunity to enjoy solitude and to get away from all of the controls our busy society places on us. Management must be geared to leave visitors alone and to plan for the least amount of contact or control over visitors within wilderness. Visitors also should be allowed to freely camp in a primitive manner. Campsite convenience structures should not be furnished. Visitor use levels should not be allowed to reach the point where the individual visitor's solitude is destroyed.

8. Control and reduce the adverse physical and social impacts of human use in wilderness through education or minimum regulation.

When human use must be controlled to prevent overuse and wilderness resource damage, it is best to do so in the following order of increasing control: (1) education in proper wilderness camping and travel techniques; (2) indirect control methods, such as dispersion of use; and (3) the minimum regulation of use necessary to meet management objectives. Where overuse in the form of damage to the wilderness resource or of overcrowding is occurring, specific steps should be taken to reduce these impacts. Tighter temporary or long-term controls through a permit/quota system may be necessary. Restoration of use sites through natural or artificial means may be justified.

9. Favor wilderness dependent activities when managing wilderness use.

Wilderness is a scarce resource, and many recreational or other activities taking place in wilderness can be enjoyed as well or better elsewhere. Some examples of these activities are cross-country skiing on groomed tracks, horse or foot racing, recreation using mechanical devices, and manipulative research. Managers should not wait for severe conflicts to occur between activities before taking steps to shift nondependent activities outside of the wilderness.

10. Exclude the sight, sound, and other tangible evidence of motorized equipment or mechanical transport wherever possible within wilderness.

One of the most important directions the American Wilderness Act gives is to ban the use of motorized equipment and mechanical transport within wilderness. This direction provides for a place to get away from our heavily motorized and mechanized society. The Wilderness Act allows managers to approve their use for emergencies or if their use is the minimum necessary for a wilderness management job. The Act also allows managers to permit prior existing aircraft and motorboat use and motorized access to surrounded private lands. (The Alaska law provides for general public motorized travel.)

Therefore, the management goal is to exclude the evidence of these activities wherever possible. Managers must take the lead in demonstrating that management tasks can be performed very well by primitive or traditional nonmotorized methods.

11. Remove existing structures and terminate uses and activities not essential to wilderness management or not provided for by law.

These structures are primarily administrative buildings or camp structures from the past, and managers should lead the way in demonstrating that not all of them are necessary for wilderness management. Administrative cabins, lookouts, trail shelters, radio towers, weather stations, and the like have a huge impact on one of the important characteristics of wilderness—that it is a place not occupied or modified by mankind. Even a so-called "small" weather station is an occupation of the wilderness. It is an established permanent human base of operations and the very antithesis of wilderness, where humans should be visitors only and not leave evidence of their presence behind.

12. Accomplish necessary wilderness management work with the "minimum tool."

This principle means taking a look at each and every planned management action and seeing first if it is necessary, then planning to do it with the minimum tool that will accomplish the job. This very important principle leads managers to maintain a true "wilderness environment." For example, hand tools create less lasting impacts on the land than larger, more powerful motorized equipment. Abused vegetation will, in most cases, heal naturally without extensive modern restoration work. Questions, such as can the trail crew get by with three horses instead of four, or could they do the work without livestock, should be asked by managers. Managers must train wilderness workers in the use and maintenance of traditional hand tools and primitive travel methods. Management leadership in the maintenance of traditional skills among workers will carry over to wilderness visitors.

13. Establish specific management objectives, with public involvement, in a management plan for each wilderness.

By using these principles from the Act and by involving wilderness users, managers should define acceptable levels of use and specific management practices for each wilderness. These are documented in a management plan. Each of the characteristics of the wilderness resource and each other resource and activity is addressed in the plan. It is essential that wilderness visitors and other users understand the purpose of wilderness and support management decisions.

14. Harmonize wilderness and adjacent land management activities.

Wilderness does not exist in a vacuum. Managers must plan activities on both sides of the wilderness boundary in a manner that recognizes the diverse land management goals of each type of land. For example, constructing a large campground or a large parking lot at a wilderness trail head can lead to overuse in the wilderness. As an example in the other direction, severe insect outbreaks within the wilderness may cause unacceptable damage to valuable resources outside the wilderness if not controlled.

15. Manage wilderness with interdisciplinary scientific skills.

Because of the complex relationship of other resources with the wilderness resource, managers must use the skills of resource and social science specialists in management practice decisions. The interdisciplinary team must focus on preserving wilderness as a resource. Managers must assure themselves that each resource specialist understands the purpose of wilderness and the principles of wilderness management.

16. Manage special exceptions provided for by wilderness legislation (for example, mining, grazing, and access to private lands with minimum impact on the wilderness resource.

To pass the Wilderness Act, a compromise was necessary to protect surrounded private landowners and to provide for certain rights and activities taking place before the law passed. Subsequent wilderness legislation also has provided for special exceptions that do not normally conform to the concept of wilderness but nevertheless are to be properly managed in wilderness. In all cases, the will of the United States people is to provide for those special exceptions while keeping the Wilderness Act's basic wilderness management direction intact. Congress has made this clear by ensuring that special exceptions provided for in new laws were confined to specific wildernesses and at the same time directing that each new wilderness be managed according to the Wilderness Act.

There are many different ways to manage these special provisions, and managers should seek the way that provides the least impact on wilderness character. Some examples are: access to private land might be by trail or a very simple road versus by a high-standard road; approved access for mineral exploration might be by air instead of by a new road; and many grazing management activities can be performed without the use of motorized equipment.

These principles are the basic management direction for every National Forest wilderness. Under the guidance of these principles, wilderness managers develop specific management practices to "fit" the ecological characteristics of each wilderness. However, because the wilderness resource is complex and the Wilderness Act can be interpreted in various ways, further specific management direction is contained in each managing agency's directive system. These directives were developed with these principles in mind. No directive system can answer all the questions that arise in managing wilderness, but a manager well grounded in these principles will make good wilderness management decisions. These principles, or a similar set based on a different

law, can be used to guide management of any wilderness in the world.

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THE FOREST SERVICE WILDERNESS MANAGEMENT RESEARCH PROGRAM*

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ABSTRACT

A Forest Service research program has addressed wilderness management problems for 20 years. This paper reviews the challenge of wilderness management, the Forest Service research program, some of the results of the research, management techniques developed and their application, and publications available.

THE WILDERNESS CHALLENGE

The United States established a National Wilderness Preservation System in 1964 with passage of the Wilderness Act (Public Law 88-577). Since then, the Wilderness System grew as new areas were added, until in 1987 there are about 450 areas in 44 of the 50 States, totaling 89 million acres (36 million ha). Four Federal agencies have wilderness on lands they manage: the National Park Service, the Fish and Wildlife Service, the Bureau of Land Management (all in the Department of the Interior), and the Forest Service (in the Department of Agriculture).

A large part of the land managed by these agencies is wilderness. For example, more than a sixth of National Forest System land is now wilderness. The Wilderness Act and prevailing concepts of wilderness create a difficult challenge for wilderness managers. They have two main, broad objectives: (1) perpetuation of natural conditions and natural processes, and (2) provision of opportunities for a wilderness experience for visitors, an experience featuring "outstanding opportunities for solitude or primitive recreation." Both objectives are difficult to achieve. Elements related to each objective interact in complex ways, and sometimes they conflict. There are

few easy or obvious solutions to wilderness management issues.

Wilderness receives substantial recreational use, annually about 15 million recreation visitor-days (defined as one person present for recreational purposes for 12 hours). Almost two-thirds of the Wilderness System land is in Alaska, remote from most people and lightly used. The wilderness in the conterminous 48 States is used more. Some areas are used heavily, particularly for lands intended to offer opportunities for solitude and to exhibit little human impact on natural conditions.

A WILDERNESS MANAGEMENT PROGRAM

The Forest Service recognized the need to improve the knowledge base for wilderness management shortly after passage of the Wilderness Act. As part of the overall Forest Service research program, a new research unit was established in 1967 in Missoula, MT, as part of the Intermountain Research Station's program.

The wilderness research unit has never been large. Most of the time it has included two scientists. Nevertheless, the unit has carried out a substantial part of all wilderness management research over the last 20 years. It has provided continuity to the entire wilderness research effort while supporting cooperative research by scientists in universities and other research organizations. Research is applied to important management problems. Transferring research results to wilderness managers is emphasized.

Supporting management of wilderness involves both social and ecological research. In general, social research seeks to understand visitors and how management affects visitor use, behavior, and the quality of experiences.

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Ecological research attempts to understand how visitor use alters natural ecosystems as a basis for determining how such impacts may be reduced.

SOME RESEARCH RESULTS

Carrying Capacity Research

Much of the past research has been on carrying capacity—in other words, how to limit the effects of visitor use on wilderness quality (Frissell and Stankey 1972; Lime and Stankey 1971; Stankey 1980, 1982b). Solitude (relatively few encounters with other visitors) as a dimension of high-quality wilderness experiences has been one focus of carrying capacity research (Lucas and Stankey 1974). Survey research with wilderness visitors has provided empirical information about how visitors perceive solitude (Hendee and others 1978; Stankey 1973). Solitude is important to most visitors, but not all, and they vary in their standards for acceptable solitude.

Solitude is most important at campsites. A large majority of visitors say they prefer no other groups camped within sight and sound of their group's camp. Encounters while traveling seem less critical, with most visitors reporting that encounters with two or three other groups per day were acceptable. Some visitors prefer a few encounters to none at all. Absolute solitude is not always most desirable. Encounters are more acceptable in the periphery of an area than in its core. Total numbers of other groups encountered is not the only or even necessarily the most important factor influencing the experience of solitude. The types of groups encountered influence the acceptability of encounters. Encounters with large groups negatively affect solitude. Partly as a result of this research, many wilderness managers now limit party size (Washburne and Cole 1983).

Another focus of carrying capacity research has been visitor impacts to the environment. The emphasis has been on impacts on soil and vegetation at trails and, especially, campsites (Cole 1987). Most types of impact are not closely related to amount of use (Cole 1982b). The effect of use varies between

durable and fragile environments and locations, among different types of visitor use, with the impact factor being measured, and with the range of use levels being studied (Cole 1987).

One conclusion is that the effect of a small amount of use on a previously unaffected site is large, and the effect of increasing amounts of use is less and less, producing a curvilinear relationship. Impacts to trails come more from construction than use, and erosion is related to location, design, and maintenance, especially to controlling water runoff, more than to the amount of use.

Visitor impacts can vary widely depending on human behavior. Careful, skilled wilderness users cause much less impact than unskilled, careless visitors. There are a variety of techniques for limiting impacts (Cole 1981, 1987).

The geographical distribution of wilderness recreational use also relates to carrying capacity concerns. Without exception, all studies show highly concentrated recreational use (Hendee and others 1978; Lucas 1980). A small proportion of access points, of miles of trails, and of campsites accounts for most use, with much of the typical wilderness only lightly used. Visitor impacts are also highly concentrated (Cole 1982a). The areas most heavily used are not necessarily those best able to support heavy use.

Limits of Acceptable Change

The earliest concepts about carrying capacity assumed that degradation of the environment and of the quality of visitors' experiences were the result of too much use and that the main solution was to reduce use. But the research reviewed above made it increasingly clear that amount of use was not the only cause of wilderness degradation, and often not the most important. Focusing management on reducing use was an indirect approach and doomed to limited effectiveness. The basic question was reformulated from "How much use is too much?" to "What sort of conditions are essential in wilderness?" (Washburne 1982).

This led to the Limits of Acceptable Change (LAC) approach to managing for wilderness carrying capacity (Stankey and others 1985). Basically, the approach involves selecting indicators of important wilderness qualities (such as natural wildlife populations, minimal campsite impacts, solitude), establishing a standard below which the condition of each indicator is unacceptable, and selecting management actions to avoid or correct specific unacceptable conditions. Instead of relying just on limiting use, managers might deal with a particular problem by modifying the type of use, its timing, location, or certain visitor behavior.

Because both the land and the visitors vary in sensitivity to impacts, usually the wilderness is subdivided into several management units with standards varying between more accessible and more remote portions. Even in the most accessible zone, conditions must at least meet the basic definition of wilderness.

The LAC approach seems consistent with research knowledge and wilderness objectives. It is being applied widely and seems successful.

Other Research

We have conducted research on a variety of other wilderness management questions. Baseline descriptions of wilderness use patterns, visitor characteristics, and attitudes have been developed (Lucas 1980; Roggenbuck and Lucas 1987). Trends in wilderness use and users have been identified and analyzed (Lucas 1985; Petersen 1981). Visitor knowledge about and attitudes toward allowing fire to more nearly play its natural ecological role in wilderness have been studied (McCool and Stankey 1986). General managerial approaches have been analyzed (Lucas 1973, 1983b; Stankey 1982a). Use rationing has been evaluated conceptually (Stankey and Baden 1977) and empirically (Stankey 1979). Human-wildlife conflicts have been examined (Bromley 1985; Ream 1980). Perceptions of environmental impacts in wilderness have been described (Clark and Stankey 1979; Lucas 1979; Shelby and Harris 1985). Health hazards from disposal of human

wastes in undeveloped wilderness were studied (Temple and others 1982). The limited effectiveness of campsite closure for recovery from degradation was identified (Cole and Ranz 1983). Recreation visitors' choice behavior was investigated (Stankey and McCool 1985).

SOME MANAGEMENT TECHNIQUES

Much of our research has led to development of management techniques. The LAC system is one good example, but there are others. Monitoring conditions is essential for effective wilderness management, especially for application of the LAC system. Techniques for monitoring trails (Cole 1983a) and campsites (Cole 1983b; Frissell 1978) have been developed and tested and are being used widely.

Methods for estimating amount of use have been at least partially developed. The emphasis has been on making trail registration systems an effective basis for estimating total use (Lucas 1983a; Lucas and Kovalicky 1981; Lucas and others 1971; Petersen 1985).

Information provided to potential wilderness visitors can be a partial alternative to regulation and control. This is a desirable tradeoff. Managers are using information more as a management tool. Unfortunately, there is little research to guide them in using it most effectively. This is the current emphasis in the wilderness management research unit's program. Past research has provided guidelines for using information to encourage redistribution of use through influencing visitors' voluntary choices. Results of various approaches have varied from minimal to substantial, but certain principles seem to offer good chances for success (Lucas 1981). Other research has contributed to the content of information programs (Cole and Benedict 1983).

A computer-based simulation model (Shechter and Lucas 1978) enables managers to view probable recreational use distributions and associated encounter levels (to indicate degree of solitude in different locations) resulting from changes in amount of use or in use of different access points. The model enables managers to answer "what if" questions quickly without

risking damage to wilderness resources through actual on-the-ground experimentation.

Research results, particularly related to management techniques, have been explained at numerous meetings, workshops, and short courses, as well as in publications. A list of all publications, with a form for requesting papers, is available upon request to the author. More than 170 publications over 20 years are listed. The more recent publications have brief annotations. All but a few books are available free of charge. Requests are welcomed.

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MAINTAINING WILDERNESS QUALITY THROUGH THE LIMITS OF ACCEPTABLE CHANGE PLANNING SYSTEM*

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Allocating resources to wilderness and other similar protected land designations continues to be a volatile and socially costly process. The political battles fought to protect and preserve pristine landscapes have been difficult, intense, and lengthy. The vigor with which world conservationists have pursued the wilderness concept reflects the importance of pristine environments across different societies. Unfortunately, designation alone is not sufficient to protect the values for which so many have fought in the allocation process.

Management is also needed. Because wilderness boundaries are usually based on compromises developed in the political process—rather than ecological principles—human activities outside wilderness areas often influence natural processes and conditions inside wilderness boundaries. And, often recreational use of wilderness requires that management action be initiated to protect sensitive values. Washburne and Cole (1983) reported in their study of American wilderness managers that many feel that recreational use exceeds capacity in at least some places within their wilderness.

These concerns are not limited to North American situations. Worldwide, parks, wildernesses and other similar protected lands are subject to an increasing variety and intensity of human-induced influences, which, at the greatest extreme, endanger the integrity of the values that were the original object of preservation efforts. For example, in their illuminating study on the state of the world's

parks, Machlis and Tichnell (1985) reported more than 1600 individual threats to the 100 parks they surveyed. They concluded that "the national parks of the world currently face threats to every subsystem—air, water, soil, vegetation, animal life, and management." At least some of this inappropriate impact is the result of too many visitors or the effects of recreational use within the park: 23% of the parks in the Machlis and Tichnell study reported "too many visitors" as a threat.

In summary, then, it has become obvious that protection through designation does not necessarily insure preservation of the important values and ecosystems within wilderness. Administration of wilderness after designation can only be a dynamic and continuous process: Problems arise, decisions are made, actions are taken, results evaluated, and further action is implemented if needed.

ALTERNATIVE APPROACHES FOR MANAGING WILDERNESS

Accepting the need for management, how should issues and problems be addressed? Wilderness managers have several alternative approaches from which to choose when addressing human-induced impact problems.

"Do Nothing"

The strategy of making no decisions, ignoring problems or consciously avoiding difficult decisions and situations is one alternative some have chosen to pursue, although few would publicly admit it. We include this alternative here, not to advocate it, but simply to identify it as one approach. Certainly, taking decisive action in some situations may lead to stressful personal and professional risk, and may subject the manager

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to undeserving vitriolic criticism by the affected public. Some managers may feel that the immediate negative personal consequences of risk-taking accompanied by failure outweigh the potential long-term impersonal and intangible benefits accruing to the wilderness resource.

"Ad Hoc" Decision Making

Many managers, realizing that problems need immediate attention, attempt to resolve the problem through an implicit "ad hoc" decision-making style. Decisions are made without reference to explicitly derived and accepted long-term goals and objectives. For example, Clark and Stankey (1979) described how two lakes in Washington's Cascade Mountains underwent development over a period of 80 years in response to a series of specific human-induced impact problems. There were no long-term goals and objectives that determined what type of recreation opportunity was to be provided at the lakes; thus, a series of incremental changes over this period created new opportunities and destroyed old ones lost without a systematic evaluation of the decisions made.

An "ad hoc" decision-making style may seem acceptable, at least in the short run, because problems appear to be solved. Unfortunately, the locale of the problems may be shifted, not solved. For example, prohibiting camping at a wilderness lake near a trailhead may reduce impacts at the lake, but shift the location of the impacts to other, more pristine lakes. The incremental nature of "ad hoc" decisions may eventually lead a decision-maker to a situation never explicitly intended or result in irreversible and unexpected outcomes.

Limiting or Dispersing Recreation Use

In the early 1970's, managers of many Western North American whitewater rivers reacted to the growth of river floating and the resulting impacts and problems by setting limits in the number of people who could float the river. There are similar limits on recreational use of wilderness and national park backcountry in many areas. This approach had the apparent immediate effect of limiting further degradation of the resource and recreational opportunity and allowed increased administrative control of

backcountry users. In some situations, it also gave agencies more opportunity to educate visitors about appropriate backcountry or wilderness behavior.

Other managers often respond to the problem of use intensity and its associated negative consequences by recommending that use be dispersed. In many wildernesses, use is characterized by large geographic and temporal concentrations (Roggenbuck and Lucas 1987). Washburne and Cole (1983) reported that about half of the managers they surveyed attempted to disperse visitors more equally within areas. Redistribution OF use ("spreading it out"), managers argue, can reduce impacts.

Limiting or distributing recreational use are viable options in some management situations. However, such strategies assume an invariant cause-effect relationship between use levels and impact, and assume that the relationship is direct and linear.

Our understanding of the use-impact relationship now tells us that it is anything but direct, invariant and linear (Cole 1987). Impacts are largely influenced by visitor behavior and the bio-physical character of the resource. Thus, use limits may be relatively ineffective in resolving the problem they were established to control, and can direct the manager's attention to the wrong set of questions concerning management of use and impacts. Use limit policies also open the door to a whole host of complex legal, administrative, jurisdictional and political issues that many managers are ill-equipped to confront.

Because low levels of recreation use may lead to disproportionately high levels of impact, use dispersal can result in a wider distribution of impacts without a significant reduction of impacts in the problem areas. Likewise, more even distribution of use may result in loss of opportunities for solitude in places or at times that formerly had such opportunities.

The "Decision-Making Framework" Approach

The obvious weaknesses in the above approaches to wilderness management suggest that an explicit decision-making framework be used to resolve problems. A framework is a comprehensive, systematic and explicit process of problem-solving. It identifies goals and evaluative criteria before there is a need to make decisions. In a sense, it establishes the rules by which decisions will be made. A framework provides the manager with the route to get to a specific condition or situation, a condition explicitly described and accepted in goal statements.

ATTRIBUTES OF DECISION-MAKING FRAMEWORKS

Given the above, what attributes characterize an acceptable decision-making framework? We propose that any framework for wilderness management be tested for the following:

1. **Rational and Systematic.** The framework must make sense to managers and the affected public. Managers will have to establish and maintain the legitimacy of the planning process to those affected by it. The flow of activity from one step to another must be clearly apparent.
2. **Explicitness and Defensibility.** The planning activities occurring within the framework should be explicit and should minimize the amount of implicit and internal decision-making. By making the process explicit and rational, the process and its outposts become defensible.
3. **Adaptable.** The framework itself should be general enough to be adaptable to a wide variety of wilderness and backcountry situations. The framework should not be overly dependent on the specific laws and mandates guiding management of an area, although this information should be incorporated into the planning process. Through understanding the rationale for the framework, changes in it to meet the requirements of a specific situation may be made without affecting the integrity of the framework.
4. **Process rather than output oriented.** The framework should be directed toward the process of problem-solving rather than the output itself; that is, the framework should institutionalize a process of making decisions. Since it is impossible to anticipate all potential problems, the framework would provide managers with a consistent methodology for approaching unexpected situations.
5. **Based on substantive knowledge.** The framework must ensure that the knowledge base (Lucas 1986, 1987) developed for wilderness and backcountry situations is incorporated into the decision-making process. This would help identify cause-effect relationships.
6. **Requires use of goals and objectives.** Many authors have stressed the need for good objectives in the decision-making process (Lime and Stankey 1971; Brown 1977; Hendee et al. 1978). Schomaker (1984) suggests that useful goals and objectives are those characterized by being specific, output oriented, quantifiable, time bounded, and attainable.
7. **Political viability.** Wilderness management occurs within politicized settings. In those types of settings, establishing and maintaining the legitimacy of the decision-making process is important to the success of the problem-solving efforts. Therefore, the framework must allow for constructive public input and involvement at various stages as appropriate.

Several decision-making frameworks proposed for wilderness and backcountry management situations meet these criteria to varying degrees (Brown 1977; Graefe and others 1986; Shelby and Heberlein 1986; Stankey and others 1985). Nearly all these were the result of

dissatisfaction with traditional carrying capacity models and their failure to adequately address problems of use and impact. Most incorporate the concepts of objectives, management actions and monitoring as essential characteristics; several also use the idea of wilderness resource indicators (performance criteria, impact parameters) and standards. In this paper, we will briefly discuss the Limits of Acceptable Change planning system because of our familiarity in developing and implementing it.

LIMITS OF ACCEPTABLE CHANGE AS A WILDERNESS DECISION-MAKING FRAMEWORK

The Limits of Acceptable Change (LAC) planning system is a nine step process that focuses on identifying desired wilderness resource and social conditions and then prescribing management actions to preserve, restore, or enhance those conditions.

1). Identify area issues and concerns. Citizens and managers meet to identify what special features or qualities within an area require attention, what management problems or concerns have to be dealt with, what issues the public considers important in the area's management, and what role the area plays in both a regional and national context. This step encourages a better understanding of the wilderness resource, a general concept of how the resource should be managed and agreement on principal management issues.

2). Define and describe wilderness recreation opportunity classes. Any wilderness area contains a diversity of physical-biological features, use levels, evidence of recreation and other human uses, and type of wilderness experiences. The type of management needed will also vary throughout an area. Opportunity classes describe subdivisions or zones of wilderness where different resource, social and managerial conditions will be maintained. These classes represent a way of defining a range of diverse conditions within the wilderness. Although preserving pristine conditions and diversity is the objective here, it is important to point out that the conditions found in all cases must be

consistent with the area's designation as wilderness. The definition of opportunity classes is not an excuse to maintain conditions inappropriate in a wilderness.

In step 2, we define the number of classes that will be managed and develop general descriptions of the kinds of resource, social and managerial conditions appropriate to each. For example, Table 1 shows the resource and social settings identified as appropriate in each of four opportunity classes in Montana's Bob Marshall Wilderness; these range from pristine conditions to one typified by relatively more visible impacts of human use. Such classes serve as management objectives for specific areas of the wilderness.

3). Select indicators of resource and social conditions. Indicators are specific elements of the resource and social setting whose condition is taken to represent (or to be "indicative of") the overall conditions deemed appropriate and acceptable in each opportunity class. Because it is impossible to measure the condition of every resource and social feature in a wilderness, we select a few indicators as measures of the overall conditions of "health" of the area. Examples would include amount of bare ground at campsites or average number of other groups encountered per day. Indicators should be easy to measure quantitatively, relate to the conditions specified by the opportunity classes and reflect changes in recreation use.

Indicators are an important part of the LAC process because their condition reflects the overall situation found throughout the opportunity class. It is important to understand that it is unlikely that any one individual indicator can adequately depict the overall condition of a particular area. It is the "bundle" of indicators that is used to monitor an area.

4). Inventory existing resource and social conditions. Inventories can be a time-consuming and expensive part of planning. In the LAC framework, the inventory is guided by the indicators selected in step 3, although other factors, such as bridges, lookout towers, outfitter base camps and critical habitat, can be inventoried. This information is helpful later

Table 1. Summary of resource and social setting components for each opportunity class.

| | <u>Opportunity Class I</u> | <u>Opportunity Class II</u> | <u>Opportunity Class III</u> | <u>Opportunity Class IV</u> |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
| Resource Setting: | | | | |
| (General Description) | <u>Unmodified natural environment</u> | <u>Unmodified natural environment</u> | <u>Unmodified natural environment</u> | <u>Predominantly unmodified natural environment</u> |
| 1. Ecological conditions | Not measurably affected by the action of users | Minimally affected by the action of users | Moderately affected by the action of users | Many sites affected by the action of users |
| 2. Prevalence and duration of impact | Temporary loss of vegetation where camping occurs and along some travel routes. Typically recovers on an annual basis | Minor loss of vegetation where camping occurs and along most travel routes. Most impacts recover on an annual basis | Moderate loss of vegetation where camping occurs and along most travel routes. Impacts in some areas persist from year to year | Moderate loss of vegetation and soil on major travel routes, human impacted sites, & popular lake shores. Impacts persist from year to year. |
| 3. Visibility of impacts | Not apparent to most visitors | Apparent to only a low number of visitors | Apparent to a moderate number of visitors | Impacts are readily apparent to most visitors |
| Social Setting: | | | | |
| (General Description) | <u>Outstanding opportunity for isolation and solitude</u> | <u>High opportunity for isolation and solitude</u> | <u>Moderate opportunity for isolation and solitude</u> | <u>Moderate to low opportunity for isolation and solitude</u> |
| 1. General level of encounters | Very infrequent | Low | Moderate | Moderate - High |
| 2. Degree of challenge and risk | Very high | High | Moderate | Moderate - Low |
| 3. Inter-party contacts while traveling | Very few | Low | Moderately frequent | Relatively high |
| 4. Inter-party contacts at the campsite | Nonexistent | Fairly low | Moderately frequent | Common |

when the consequences of various alternatives are being evaluated. The inventory data are mapped so that both the condition and location of the indicators are known. The inventory provides a measure of the indicators' existing condition throughout the area, as well as a data base from which managers can formulate the standards for each indicator in each opportunity class.

5). Specify standards for resource and social conditions in each opportunity class. Here we identify the range of conditions for each indicator considered appropriate and acceptable for each opportunity class. By defining those conditions in measurable terms, we provide the basis for establishing a distinctive, diverse range of wilderness opportunities. Standards serve to define the "limits of acceptable change." They are the maximum permissible change in natural conditions that will be allowed in a specific opportunity class; they are not necessarily objectives.

The inventory data collected in step 4 play an important role in setting standards. We want the standards defining the range of acceptable conditions in each opportunity class to be realistic and attainable; we also want them to do more than mimic existing conditions. Standards play the critical role of indicating when and where restoration or enhancement might be needed.

6). Identify alternative opportunity class allocations reflecting area-wide issues and concerns and existing resource and social conditions. Most wildernesses could be managed in several different ways and still retain their basic wilderness qualities. In step 6, we begin to identify some of these different alternatives. The various opportunity classes or zones are mapped, and may cover different areas, depending on the alternative. Using information from step 1 (area issues and concerns) and step 4 (inventory of existing conditions), managers and citizens can begin to explore how well different opportunity class allocations meet varying interests, concerns and values.

7). Identify management actions for each alternative. The alternative allocations proposed in step 6 are only the first step in the process of developing a preferred alternative. In addition to the kinds of conditions that would be achieved, both managers and citizens need to know what management actions would be needed to achieve the desired conditions. In a sense, step 7 requires an analysis of the costs, broadly defined, that will be imposed by each alternative. For example, many people might favor an alternative that calls for restoration of much of the area to a pristine character. However, such an alternative might necessitate introduction of strict use rationing, prohibition of horses and closure of some areas. In light of such costs, the alternative might not seem as attractive.

8) Evaluation and selection of a preferred alternative. With the various costs and benefits before them, citizens and managers can proceed to evaluate the various alternatives, and the managing authority will then select a preferred alternative. Evaluation must take many factors into consideration; one example is the responsiveness of each alternative to the issues and concerns identified in step 1 and the management requirements identified in step 7. It is important that the factors figuring into the evaluation process and their relative importance be made explicit and available for public review.

9) Implement actions and monitor conditions. After an alternative is selected, the necessary management actions (if any) are put into effect and a monitoring program instituted. The monitoring program focuses on the indicators selected in step 3 and compares their condition with those identified in the standards. This information reflects the success of the actions. If conditions do not improve, the intensity of the management effort might need to be increased or new actions implemented.

ISSUES ASSOCIATED WITH IMPLEMENTATION OF THE LIMITS OF ACCEPTABLE CHANGE PLANNING SYSTEM

There are three major issues associated with implementation of LAC. These issues are

not necessarily specific to LAC, but arise because of the comprehensiveness of the planning system. The issues include (1) nondegradation of wilderness values; (2) the rationale for classification of wilderness into different zones; and (3) involving the public in the LAC process. We will briefly discuss each of these issues, and how they are addressed in the LAC system.

Nondegradation of Wilderness Values

Hendee and others (1978) describe nondegradation as the "maintenance of present environmental conditions if they equal or exceed minimum standards." LAC was developed because previous styles of management (including the focus on carrying capacity) did not adequately address the problem of managing recreational use and how resulting impacts could be controlled from the perspective of nondegradation. The focus of carrying capacity (the question "How many is too many?") simply did not provide the kind of guidance managers needed to prevent degradation: LAC, with its system of zoning, standards and monitoring is designed to prevent further degradation of wilderness values. The quantitative standards employed in the LAC system allow agreement on what constitutes degradation.

Identifying standards, however, in no way condones the gradual degradation of environmental and social values in places where existing conditions exceed what is accepted in the standards. Standards are interpreted as the maximum amount of human-induced change that is tolerable under certain conditions; standards are not desired conditions, or the amount of change which is viewed as desirable.

The process of establishing standards requires attention to what is desired in terms of tolerable change, and is influenced (but not controlled) by existing conditions. Standards should not be based totally on current conditions or used to justify what otherwise would be unacceptable environmental and social conditions.

The Issue of Zoning Wilderness

Mapping opportunity classes or zoning in wilderness is controversial. There are objections because law established only one wilderness system. Fears also are expressed that zoning will provide an easy way to permit non-wilderness conditions to continue to exist.

In fact, in every wilderness conditions inevitably vary greatly from one place to another. Amount and type of use, impacts, access, management and the land's ability to support use all vary. Zoning recognizes this variation and makes it explicit. Planned diversity can provide protection for rare or fragile ecosystems and provide visitors opportunities to find the degree of naturalness and solitude they desire.

Zoning makes managers accountable for maintaining the conditions specified for each zone. Without formal zoning, conditions are likely to change in ways that, in effect, expand less pristine areas into more and more of the wilderness. Zoning can be as strict as managers and the public desire. Very pristine conditions can be protected in large areas. Less pristine conditions can be restricted to smaller places. No zones should permit non-wilderness conditions.

Fears about zoning wilderness do not relate to the concept, but rather to possible poor application of it. Bad consequences can occur without zoning, and, in fact, may be less readily recognized and addressed that with the area-specific direction zoning can provide.

Public Involvement in the Limits of Acceptable Change System

Public involvement in wilderness management decision-making is essential to implementation. Wilderness management generally occurs in politicized settings where pressure groups may hold "veto" power over implementation of management plans. Recent research (Ashor and others 1986) has demonstrated how new ways of involving affected publics in decision-making can enhance the value of public participation.

Ashor and others (1986) described how encouraging dialogue and mutual learning with transactive planning theory (Friedman 1973) as a basis in planning the recreation management direction for the Bob Marshall Wilderness increased the effectiveness of citizen participation over a more traditional planning situation. They concluded:

The fact remains that conflict over wilderness planning and management will continue unless managers are willing to dedicate themselves to meaningful citizen participation. Veto power in the hands of affected groups makes transactive planning a necessity in many areas. The goal of such a process is not only to increase support and the chance of successful implementation, but to create a process for decision making that affected groups will accept as legitimate, even when their demands may not be entirely met. . .

The LAC process provides the focus for constructive input by affected publics. The Bob Marshall Wilderness planning experience demonstrates that the public can be included in basic planning processes and that, with education, the public can help managers identify indicators, standards and management actions. Involving the public at this level also promotes to greater understanding of the complexity of the wilderness management job.

One of the characteristics of wilderness planning has been the many plans left on the "dusty shelf." Perhaps these past planning efforts, well intentioned, simply did not provide managers the tools they didn't already have. These plans may not have had much relevance to actual problems, there may not have been ownership by the public in them, or they may not have contained the specificity in goals and actions necessary to successful implementation.

The Limits of Acceptable Change Planning System provides wilderness and backcountry managers with the opportunity to protect those values so dearly fought for in the designation process. Through its requirements for explicitness and specificity, LAC offers tools

and processes which can enhance the quality of decision-making.

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WILDERNESS USER STANDARDS OF CAMPSITE IMPACT ACCEPTABILITY*

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Human-induced impacts resulting from recreational use of wilderness continue to be a significant management challenge, threatening the integrity of both the resource and the quality of visitor experiences. Questions related to visitor-caused impacts have been posed for years, typically taking the form how much is too much? But research has generally found no clear or predictable linear relationship between the level of use, knowledge and behavior of users, and susceptibility or resistance of the site to impact (Cole 1987). Nor has a predictable curvilinear relationship been found that would indicate a 'land intrinsic' carrying capacity.

Impacts resulting from recreational use, particularly at campsites, are a major source of concern to wilderness managers of 77 percent of all National Forest Wilderness and Primitive areas considered human-caused vegetation impacts at campsites a problem, and managers of 71 percent of these areas considered human caused soil impacts at campsites a problem. Lucas (1980a) stated that "knowledge about acceptable impacts is most critical for campsites", and pointed out that much effort goes into managing campsite impacts and use, at least some of which seems to be "based on assumed visitor perceptions and evaluations of campsite impacts" for which adequate knowledge or support does not exist. Indeed, he felt that some actions such as removing certain developments (fire rings for example) or attempting to shift camping patterns are debatable without "a clearer understanding of visitor perceptions [that] could help put such

policies on a sounder foundation, help determine the relative priority management of campsite impacts should receive, . . . and help judge the cost/benefit relation of restrictive regulation of campers" (Lucas 1980a).

Rules and regulations regarding visitor use are a common response to management concern over campsite impacts, but "such measures can severely conflict with the experiences that visitors seek and may easily jeopardize visitor feelings of freedom and spontaneity" (Lucas and others 1985). It is clear that users are extremely sensitive to management control of campsite use - Stankey (1973) found that assigned campsites were the least favored method of use control among wilderness users. Without the necessary knowledge about campsite impacts and visitor preferences "well-intentioned actions to control one type of problem might replace it with an even more serious one (Lucas and others 1985).

A current approach to dealing with the problem of human-induced change in wilderness is the Limits of Acceptable Change Planning System (LAC). As its name suggests, the LAC system concerns itself not with determining a permissible number of people, but with identifying "where, and to what extent, varying degrees of change are appropriate and acceptable. In summary, the process requires deciding what kind of wilderness conditions are acceptable, then prescribing actions to protect or achieve those conditions" (Stankey and others 1985). The first of four major components in the LAC process is the "specification of acceptable and achievable resource and social conditions, defined by a series of measurable parameters" (Stankey and others 1985). The

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traditional recreational carrying capacity of "how much change for natural conditions is acceptable? Focusing on this question directs management attention away from numbers of users and toward management for desired social and ecological conditions.

Selecting indicators and setting standards of acceptability is the heart of the LAC process. Indicators are specific variables or elements of a setting that reflect overall resource and social conditions. Examples include bare ground at a campsite or encounters with other parties on the trail. After indicators are chosen, standards are set. Standards quantify the amount of change tolerated in a specific indicator; they are the limits of acceptable change. Standards are set using information collected during an inventory of existing conditions, along with professional judgement and public input, but standards should not simply imitate the current conditions. By comparing standards with existing conditions managers can identify places where management action is needed to maintain or restore conditions to the desired level.

The critical question in this process is what constitutes acceptability. Defining acceptability is ultimately a pattern of personal judgement. Judgements reflect beliefs and evaluative standards and vary considerably. So whose definition of acceptability is used? Several studies (Lucas 1970, Hendee and Pyle 1971, Peterson 1974) have shown that managers' and users' perceptions of resource conditions can be quite different. These differences can be attributed to the different perspectives from which they view the resource.

Lucas (1979) points out some of the influences that affect managers' and user's perceptions of resource impacts: 1) managers have a professional responsibility to the resource, while a visitor's relationship to the resource is based on its aesthetic value; 2) managers are usually trained in the natural sciences and tend to observe an area in terms of its natural processes, while users normally do not have such a background and have a limited awareness of such processes; 3) managers have often had the chance to observe an area over a relatively long period of time, and tend to take a

longer-term view of changes to the area, while visitors are usually less experienced in the area and do not hold a strong future orientation.

It seems fair that neither the managers' nor the visitors' views should be used as the sole determinant in defining acceptability. But the fact that users' views are important is obvious, for wilderness carrying capacity is, in part, defined as "the ability of an area to provide the visitor with a satisfactory wilderness experience" (emphasis added; Stankey 1971).

PROBLEM STATEMENT

Among the most prevalent human-induced impacts at wilderness campsites are barren ground, tree damage, and fire rings. These impacts not only have the potential to affect the quality of visitor experiences, but also can result in long term ecological damage to the resource (within the boundaries of the disturbed area). Lucas, in unpublished data collected in 1982, found that 28 percent of overnight visitors to the Bob Marshall Wilderness Complex rejected a campsite because of its condition. Cole (1985b) states that "proliferation of campsite impacts and excessive deterioration of campsites seriously compromise wilderness goals", and adds that "the most serious problem is one of visual impact; conspicuous evidence of human impact is almost everywhere" at campsites.

Understanding how visitors perceive campsite impacts, and how such impacts influence a camper's choice, use of, and satisfaction with a campsite is extremely important if managers are to make decisions concerning the management of wilderness campsites. As the relatively new Limits of Acceptable Change Planning System is applied to wilderness management situations, more knowledge about visitor perceptions of impacts will be needed in order to determine the appropriate and acceptable resource conditions for wilderness areas.

This paper addresses the question: What are the standards of acceptability for certain campsite impacts as perceived by visitors?

THE CONCEPTUAL FRAMEWORK: EVALUATIVE STANDARDS AND SALIENCY

When encountering a particular attribute in a certain setting, different recreationists will respond to, and evaluate, that attribute differently. The reasons for differing evaluations of the same attribute are complex, and involve many variables, but central to the issue are the concepts of evaluative standards and saliency.

An evaluative standard is an individuals' personal, internalized norm, or personal definition of the acceptability of a particular attribute. Shelby and Heberlein (1984) state that "evaluative standards determine the level of an impact parameter [or attribute] that is tolerable (the maximum) or most desirable (optimum)", to go on to describe evaluative standards as 'yardsticks' for determining how much is too much."

Recreationists have different ideas about the appropriateness of different attributes, or of varying levels of the same attribute; these are expressed through their evaluative standards. These evaluative standards, or personal norms, may be based on such factors as motivations for recreating, past experience, experience expectations, preferences, and group or social norms. For example, Schreyer (1982) found that a person's amount of experience and type of group with which the person is recreating can affect expectations.

As an attribute is perceived, it is "filtered" through this evaluative standard, resulting in an evaluation of the attribute as adding to or detracting from the experience. If the evaluation is positive, it may then serve to increase satisfaction (or reduce dissatisfaction).

Understanding users' specific tolerances of varying levels of human induced impact (an attribute), as expressed through an internalized norm or evaluative standard, is important to managers trying to set appropriate standards, or limits of acceptable change, for chosen indicators (attributes).

Also important to the formation of personal norms and the evaluation of attributes is the concept of saliency. McCool (1984a) defines saliency as "the importance or relevancy of a particular setting attribute to a recreational engagement."

Saliency affects perceptions of attributes in two ways. First, it affects the formation of an internalized, evaluative standard for an attribute. If an attribute is not important to a person, then he or she will be less likely to be able to articulate an evaluative standard for that attribute, and consequently will not be able to make an evaluation of that attribute. Martin (1985), in unpublished analyses of data collected from visitors to the Selway-Bitterroot Wilderness, found that visitors for whom solitude was important (as measured by a 'privacy' outcome domain scale) were more likely to be able to articulate a standard for preferred encounters than visitors for whom solitude was less important. McCool (1984b) found that among respondents to whom encounters 'didn't matter', significantly more were in the lower quartile on the solitude outcome domain scale than in the upper quartile.

Second, saliency of an attribute influences perception of that attribute. If an attribute is not salient, a person is either likely to not perceive it at all, or perceive it in a limited or perceptually-distorted manner. Shelby and Colvin (1982) found that river floaters in the Illinois and Rogue rivers in Oregon often under-reported the number of other groups they encountered, particularly at higher encounter levels. This would suggest that for those users who under-reported encounters, solitude was not a salient attribute; if it were, one would expect reported encounters to be more accurate.

It is known that user evaluations of encounters vary according to the type and number of encounters (Stankey 1971). This would suggest that user evaluations of biophysical impacts may also vary according to the type and level of impact. Additionally, if the previous discussion concerning the varying importance of attributes to visitors is narrowed down to focus on specific biophysical impacts, it could be expected that the impacts under

investigation would vary in their saliency, and thus in their acceptability, to visitors.

METHODS

This paper on two experiments designed to investigate visitor perceptions of campsite impacts. The treatment in each experiment was the same—a series of indirect, artistic representations of impacted campsites.

A set of slides, produced from color illustrations, was used to portray the impacted campsites. The color illustrations were depictions of campsites in underdeveloped areas. By using a series of overlays, varying levels of bare ground and fire ring impact were introduced into the campsite scene. Tree damage was altered directly on the illustration by an artist.

These particular impacts were chosen because they are among the most prevalent impacts occurring at wilderness campsites, and contribute to both the visual impact and ecological integrity in the area. Bare ground and tree damage are representative of the soil and vegetation impacts that Cole and Fichtler (1983) and Cole (1982, 1983, 1985b) have found so prevalent and important at campsites in Montana and Oregon, that Washburne and Cole (1983) found were common problems of managers, and that Lucas (1985) found were disturbing to visitors. Fire rings were chosen to represent a human development type of impact that is also both visual and has associated ecological impacts (e.g. firewood gathering resulting in trampled vegetation and increased tree damage).

This research design is a modification of a design used by Shelby and Harris (1982), in which both on-site inspection and photographs of actual campsites were used. Shelby and Harris found a 90% agreement rate between photographs and on-site inspection in terms of the acceptability and desirability of the campsites. The decision to use illustrations for this study was based on a desire to control extraneous factors such as scenic, functional, or locational attributes of the campsites, and the context in which the impacts are encountered.

These factors may affect how a person perceives the impacts at a particular campsite.

Indirect representation by means of photographs, slides, or sketches are frequently used to represent an environment, or particular component of an environment, to a set of observers or respondents. By using such indirect extraneous factors such as those mentioned above may be controlled. The disadvantage, however, is the possibility of misrepresenting other components of the environment, resulting in inaccurate responses. For this reason the high agreement rate found by Shelby and Harris (1982) between direct and indirect representation of campsites is encouraging. This does not guarantee, however, that the representations used in this study are equally accurate.

A questionnaire was used to collect data. The questionnaire provided explanatory information concerning the slides that respondents would view; information about the situational context in which they would be viewed; and provided for the responses to each slide. Questions related to the respondent's amount of experience and method of travel on wilderness trips, their membership in conservation or environmental organizations, and if they hunted in wilderness were included. A ten-item modified version of the wilderness purism scale used by Stankey (1971) was also included to determine how saliency of wilderness values influenced evaluative standards of acceptability.

Dependent variables were measured through responses to each campsite slide or pair of slides; the answers to the questions described above were the independent variables.

The sample population consisted of persons attending meetings (not necessarily members) of local conservation-oriented groups such as the Sierra Club and the Backcountry Horseman's Association, and also students enrolled in Forestry and Recreation Management classes at the University of Montana (Table 1). These groups were used because they were readily available, and it was felt that such a population would contain a high percentage of wilderness

users or potential users. This was the case, as 89% of the respondents had taken at least one wilderness trip in the two years previous to the study.

The first experiment was designed to measure visitors' acceptability standards for each of the three impacts. These standards were measured by having respondents view slides in which only one impact was present at the campsite. Four levels (minimum, moderate, heavy, and severe) of each of the three impacts (bare ground, tree damage, and fire rings) resulted in twelve slides.

A slide of the campsite in its pristine condition was included, as was a slide of the campsite with 'multiple' (2) fire rings, resulting in a total of fourteen slides. These fourteen slides were of the same campsite, in the same setting, with the same background; the only variable was the type or level of impact.

The fourteen slides were randomly ordered, and the respondents were instructed to rate each campsite in terms of its conditions, not in terms of the desirability of the setting. The word "conditions" was purposely chosen instead of "impacts" because it seemed more neutral, and avoided the negative connotation of the word "impact." The respondents were then given a brief 'preview' of the slides to familiarize them with the range of impact they

would see. Responses to the slides were measured at the ordinal level using a Likert-type scale. Response choices were 'desirable', 'acceptable but not desirable', and 'unacceptable'.

The second experiment was designed to measure the relative importance of the three impacts under investigation. This was measured through a paired comparison design. Three pairs (fire ring/tree damage, fire ring/bare ground, tree damage/bare ground) for each of three impact levels (moderate, heavy and severe) resulted in nine (9) pairs. These slide pairs were shown to respondents, who simply indicated the campsite at which they would prefer to camp. Nine additional pairs utilizing a second campsite background or setting were also shown. A preliminary analysis was performed to check for significant differences in responses due to background; when none was found, the second set of nine slides was deleted.

RESULTS

While some socio-demographic characteristics normally asked of respondents (such as age, income, education) were not asked in this study, a profile of a typical respondent can be constructed as follows. A majority of the 186 respondents participated in between one and seven wilderness trips in the two years previous

Table 1. Groups tested in study

| <u>Group Name</u> | <u>Date</u> | <u>Size</u> |
|------------------------------------|-------------|-------------|
| Missoula Chapter, Sierra Club | 4/86 | 10 |
| UM Forestry Graduate Seminar | 4/86 | 15 |
| UM Introductory Recreation Class | 4/86 | 40 |
| Missoula Backcountry Horsemen | 5/86 | 11 |
| Bitterroot Backcountry Horsemen | 10/86 | 18 |
| UM Wilderness & Civilization Class | 10/86 | 19 |
| UM Introductory Recreation Class | 10/86 | 41 |
| BLM Wilderness Rangers | 11/86 | 44 |
| Falthead Backcountry Horsemen | 1/87 | 32 |

to the study. About 64% of the respondents were hikers, while one-third travelled with stock; nearly half were hunters, and just over 40% were members of conservation or environmental groups. Generally the respondents were not as strongly purist as those sampled by Stankey (1971). Possible scores on the purism scale ranged from 10 to 50; the range in this study was from 20 to 50, with the median falling between 34 and 35. Table 1 shows each of these groups that were tested along with the date of testing and sample size.

Figures 1 and 2 show the results of the first experiment in which study respondents were asked to rate campsites as "desirable", "acceptable", or "unacceptable". Figure 1 shows the percentage stating the campsite was "desirable". The percentage rating the campsite desirable or acceptable is shown in Figure 2. Note that the data indicates differing sensitivities to the three types of impacts, with respondents apparently most sensitive to barren ground and least sensitive to fire rings, at least at the lower levels of impact.

In order to determine how wilderness values may affect evaluative standards, a non-parametric correlation matrix was constructed including three variables: purism score, amount of wilderness experience, and the Acceptability Standards Index or ASI. The ASI was simply the sum of each respondent's ratings of the fourteen (14) slides of campsite impacts. The correlations are positive, but small. Only the correlation between wilderness purism and ASI (.1032) was significant at the .10 level of significance.

However, when comparisons are made using the individual types of impacts, stronger differences, particularly at the lower levels of impact are noted. Purists and nonpurists rated higher levels of tree damage and barren ground impacts similarly, but differed at the minimal level. For example, 90% of the non-purists rated the campsites with minimal bare ground impact as acceptable or desirable compared to 69% of the purists. For fire rings impacts, however, differences between purists and nonpurists were consistently stronger, as shown in Figure 3. At nearly all levels of impact,

purists rated these impacts less favorably than nonpurists.

Likewise differences between experienced and inexperienced users were found. Experienced users were defined as those spending twenty or more days in the wilderness during the past two years ($n=74$) and inexperienced users spent five or fewer days ($n=53$). While experienced and inexperienced users agreed on the desirability of campsites with bare ground, there was less agreement with respect to overall acceptability. Fifty-seven percent of the inexperienced users rated the site with moderate bare ground either acceptable or desirable, but only 43 percent of the experienced users did so. At the heavy level of bare ground impact, 53% of the inexperienced users responded favorably to the site compared to only 35% of the experienced users. Responses to campsites with tree damage did not differ except at the moderate level with the experienced users responding more favorably than inexperienced users. Finally, evaluation of the campsites with fire rings resulted in differences at the two extremes of the impact range examined here. The site with a minimal fire ring was perceived as desirable by 55% of the experienced users, but only 40% of the inexperienced users. At the other extreme, 26% of the inexperienced users thought the site was desirable compared to only 12% of the experienced users.

The results of experiment two, the paired comparisons, reinforced those of experiment one (Figure 4). In all comparisons, campsites with bare ground were chosen (preferred) least frequently, while those with tree damage were more frequently preferred, although the proportions choosing each site varied somewhat as impacts became more severe.

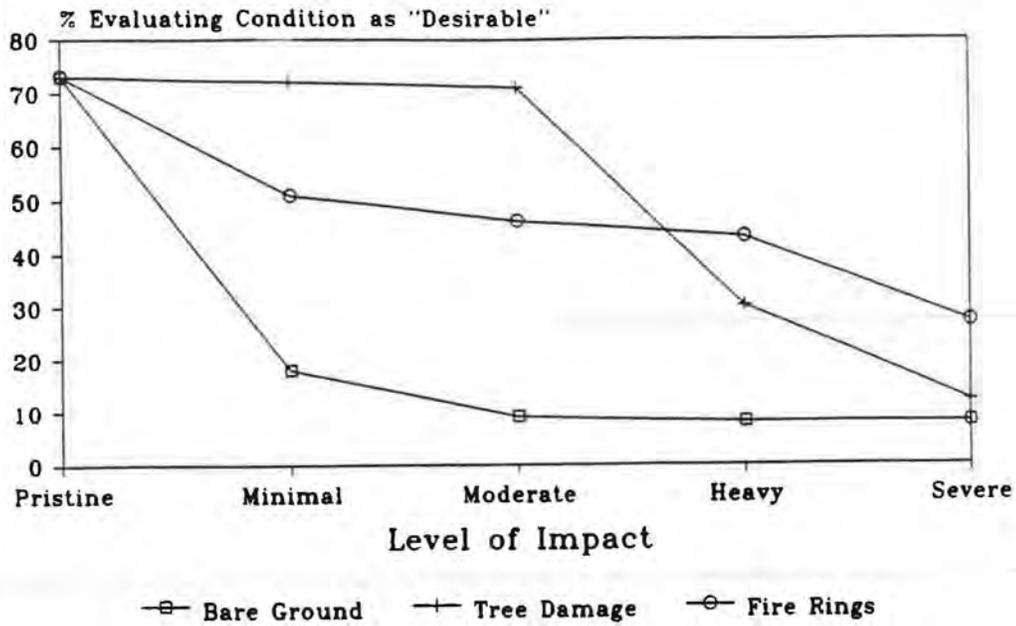


Figure 1. Desirability Ratings: Percent Rating Campsite as Desired

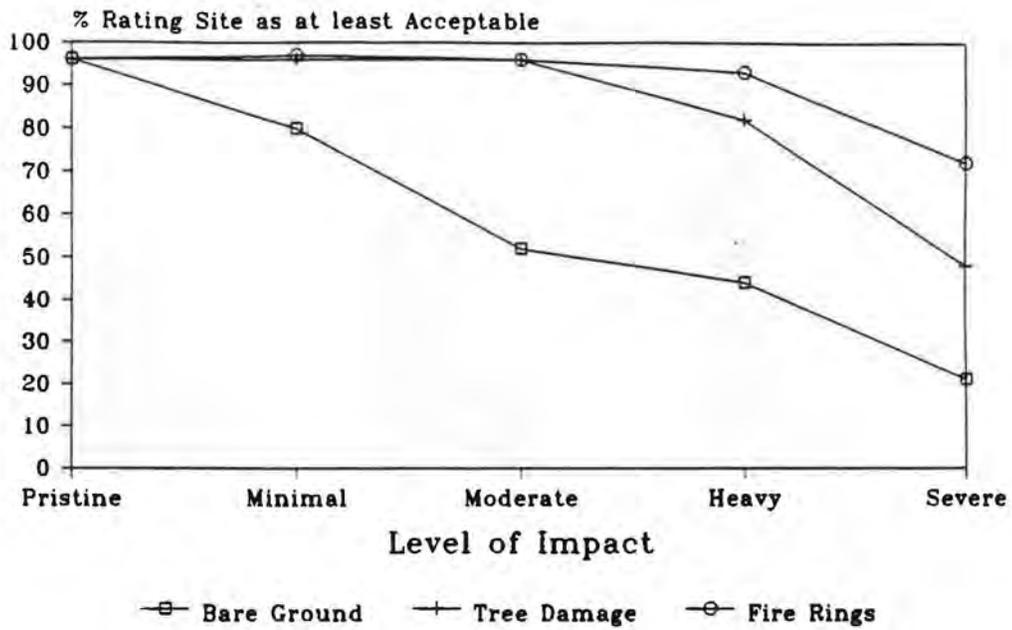


Figure 2. Overall Acceptability Rating

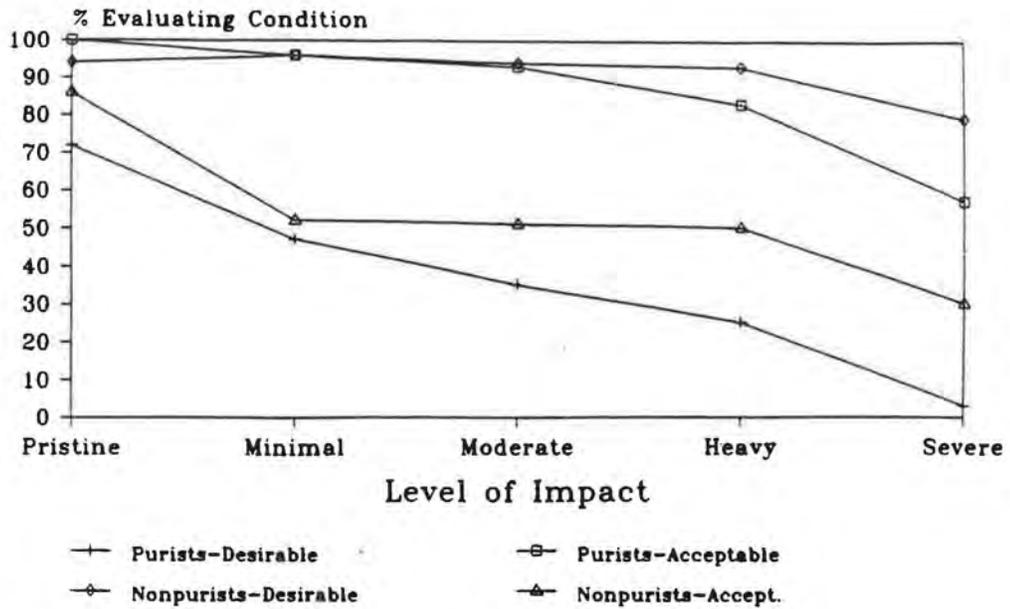


Figure 3. Purist and Nonpurist: Ratings of Fire Rings

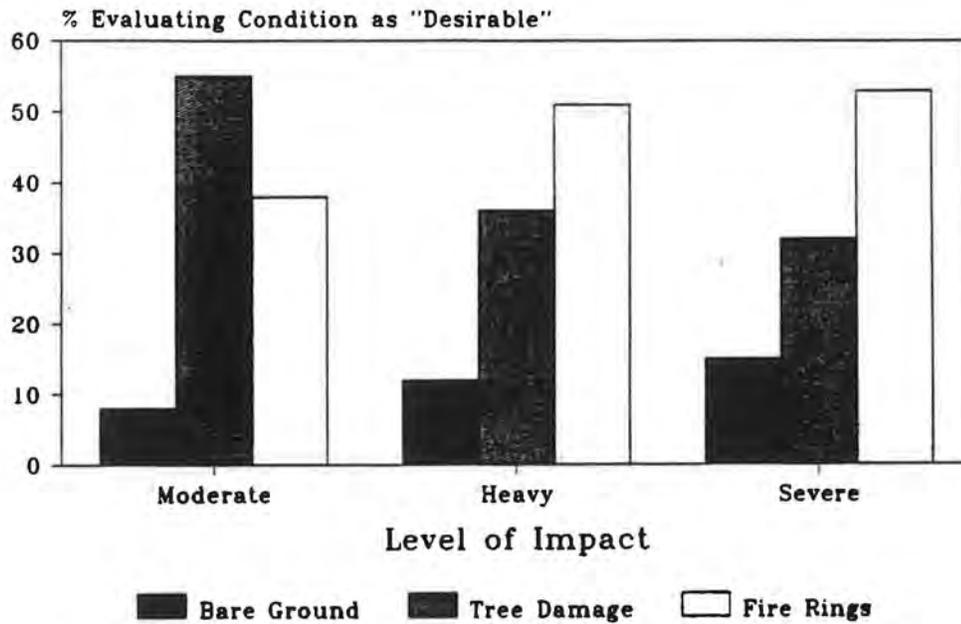


Figure 4. Paired Comparison: Preferences for Campsite Impact

DISCUSSION

The results indicate that the wilderness users consistently rated barren ground more negatively than the other two campsite impacts studied. Fire rings were rated more acceptable than other types of impacts: all levels of fire ring impact were undesirable, but none were unacceptable. These results contrast with those of Womble and others (1980) who found that visitors to three Alaskan National Parks were more bothered by tree or shrub damage and fire rings than by "hiker-made campsites" (presumably ground cover disturbance). The results agree, however with Lee's (1975) findings that the condition of ground cover (bare ground) influenced visitor satisfaction with the physical environment more than did the presence of fire rings.

The finding that bare ground is least acceptable to people can be interpreted as a clear rationale for using this impact as an indicator in the LAC process to monitor changes in the biophysical environment. It also, unfortunately, places managers in a difficult position, as bare ground is a difficult impact to control. The implication is that if the presence of bare ground has more of an effect on the desirability of the site than the amount of bare ground, managers should encourage visitors to concentrate use on fewer sites.

The results also suggest that purism might affect a user's internalized standards of acceptability for impacts more than the amount of experience. One explanation for this might be that the more experienced users have come to expect a certain amount of impact at campsites and have realistically adjusted their personal standards accordingly, while purists (not all of whom are experienced users) are sticking to their more idealistic standards.

The use of artistic representations in this study does limit interpretation of the results. Future research could involve artificially impacting sites, photographing those sites, and asking respondents to evaluate them. This type of experiment would help determine the validity of artistic representations and may extend the implications identified here.

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MONITORING WILDERNESS VISITOR PERCEPTIONS: DEVELOPING LOW-COST SYSTEMS FOR MANAGEMENT*

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Recreation monitoring systems are now receiving increasing research attention. Recreational carrying capacity has been a complex issue, but various approaches to capacity determination have now been worked out (Shechter and Lucas 1978; Stankey and others 1985; Chilman and others 1986; Shelby and Heberlein 1986). Monitoring systems are now needed to help managers determine (1) whether the carrying capacity objectives are appropriate, (2) whether changes are occurring in the management situation, and (3) ways to improve quality of recreation opportunities.

Essentially, monitoring constitutes a systematic, information-based approach to recreation management. It provides specific information about recreation use and changes occurring on recreation areas and insights about needed management actions. Monitoring supplies quantitative information in cases of controversial decisions.

If monitoring is so useful, why then has not more attention been focused on it? What problems are encountered in establishing monitoring systems? How might research be used to design monitoring systems to overcome these problems? This paper reports a series of studies used for developing and testing recreation quality monitoring systems in two locations: Desolation Wilderness in California and Ozark National Scenic Riverways in Missouri.

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RESEARCH DESIGN

Developing new kinds of recreation management systems, such as recreation monitoring, need not proceed only on an ad hoc basis. There are recognized research designs that can speed up development of needed management systems. One such design is participant observation, negative case analysis (Kidder 1981).

Participant observers begin with a preliminary hypothesis, then look for data that would disconfirm the hypothesis. When a single negative case is found the participant observer revises the hypothesis in light of that case and applies it again in another case. This process takes the place of statistical analysis, and represents inductive rather than deductive research. Various parts of the monitoring systems were thus tested in a series of studies at the two areas listed above, to compare and generalize case findings.

The particular form of participant observation used in these studies is that of a researcher participating as a member of the management staff of the field unit, i.e., as a social science research specialist. A part of the research design is to focus on situations where recreation monitoring issues are identified by field level managers who want to actively participate in finding useful approaches to the issues. The managers' active involvement provides research insights as to how they understand and communicate the issue, and whether they see the research approach as feasible.

STUDY AREAS

Desolation Wilderness is a rather small (63,475 acres), accessible, and heavily used area near Lake Tahoe in California. A recreational carrying capacity plan, based in part on simulation modelling by Shechter and Lucas

(1978), was implemented using a backpacker permit system (USDA 1978). A stipulation of the plan was that a "continuing program" be conducted to evaluate and adjust capacity. Ozark National Scenic Riverways (OZAR) consists of approximately 136 miles of river and land corridors of the Current and Jacks Fork rivers in south central Missouri. In 1985, following several years of research studies and court cases, a River Use Plan established canoe carrying capacity limits (USDI 1985). Part of that plan called for monitoring of environmental and recreational quality conditions.

Recreational quality was operationally defined as (1) providing a range of choices of recreation environments and (2) obtaining visitors' perceptions of conditions within specific environments.

SERIES OF STUDIES

Certainly one of the reasons that more work has not been done on recreation monitoring is that public agencies are in a period of budget retrenchment. Cutbacks in management budgets have precluded consideration of new programs. That was the case in 1982 when a Regional Office inspection report pointed out that Desolation Wilderness managers "have not monitored use to see whether quotas are accomplishing their purposes." No additional funding was supplied to meet this requirement, also no instructions were provided as to how monitoring was to be done.

Researchers at Southern Illinois University were contacted to assist with designing a monitoring program because they had previously developed a low-cost recreation inventory procedure for the Lake Tahoe Basin (Chilman and Hampton 1982). No research funding was provided, so a series of small studies involving several days each summer for several summers were initiated. Researchers were to participate with management staff and wilderness rangers in designing a monitoring system.

Because of budget constraints, it was apparent that monitoring data collection would have to be done by existing personnel. Our preliminary hypothesis was that data collection

methods were available and that wilderness rangers could be trained to utilize them. A wilderness campsite monitoring system was already being used, so attention was directed to social monitoring. The simulation methodology employed by Shechter and Lucas (1978) was judged too complicated and expensive. Instead, a short set of questions that had been developed and tested at other areas about visitors' perceptions of recreation quality conditions was substituted (Chilman and Kao 1982; Chilman and others 1984).

Studies were conducted of the wilderness rangers' work routines in 1983 and 1984. The rangers were trained to administer the short set of questions. Essentially, it was determined that each interview would take about five minutes per workday, a sample size of 400 could be obtained for the summer (Chilman 1986). In 1985, the wilderness rangers did interviews, but only 104 were obtained. These interviews indicated conditions were generally acceptable to Desolation visitors, and that monitoring of this kind could be accomplished inexpensively. However, problems were noted: lack of commitment to obtaining a larger sample, how data were to be analyzed and reported, and visitors' recommendations for improvements were non are-specific.

To improve sample size, more emphasis was needed on importance and usefulness of the data. Probably a weekly quota of interviews would need to be assessed for each ranger as a work requirement. For data handling and analysis, a system of summarizing interviews weekly and monthly was recommended (Haas and Nachtman 1979). This can be supplemented by computer use in district offices as simple programs are developed. It was the last observation of lack of monitoring data focus on specific areas, however, that caused us to modify our monitoring design hypothesis.

Partly to meet the severe budget constraints, and partly to focus the monitoring information on specific areas and sites, we modified our hypothesis by dividing the large wilderness area into management subunits, each to have a more intensive monitoring remeasurement every third year. We added

counts of visitors on main trails to compare to the perception interviews. To accomplish day-long counts, it was possible to use volunteer workers three or four days a week. To design this more intensive data collection system, reconnaissance of the Echo Lake and Glen Alpine subunits was carried out in 1986 and 1987.

At about this same time, an opportunity to test and refine the monitoring strategy in another location presented itself at Ozark National Scenic Riverways, as the 1985 River Use Plan called for a monitoring program. Again, because of budget constraints, the decision was made to divide the Riverways area into three parts, each to be sampled every third year. In 1986, canoe counts and interviews were conducted on the Upper Current section, and in 1987 on the Jacks Fork portion. Enough funding was provided to employ a research assistant and a volunteer for data collection.

In 1987, monitoring of land-based recreation use (primarily campsites accessible by road and dispersed along the rivers) was added to the canoe counts and interviews. OZAR is divided into ten zones for management purposes, with park rangers assigned for patrol and public safety purposes. Counts and short interviews will be conducted by the rangers, supplemented by research assistant counts of day users at some locations. Site impact areas had been mapped and recorded for monitoring purposes (Mendiola 1986).

RESULTS

From the above series of studies, we have developed monitoring systems that can provide considerable useful information at low costs. The research design used allowed us to modify our hypothesis, and the monitoring systems, to move ahead as problems were encountered.

Problems included low management budgets, design of measurement systems for large and diverse areas, lack of specific management objectives, and lack of long-term commitment to data collection and analysis. To deal with the constraint of low budgets, available field personnel such as rangers and

volunteers were utilized for data collection. Also, following reconnaissance of management areas, priority areas for data collection were identified rather than trying to measure all recreation use sites within large areas.

The problem of lack of specific management objectives will be more manageable as new systems of carrying capacity planning, such as Limits of Acceptable Change (Stankey and others 1985), are utilized. For other areas, including Desolation and OZAR, monitoring information can help in replanning efforts toward more specific objectives. Problems of lack of long-term commitment should be resolved as we develop more evidence of the utility of the monitoring information.

Although we are still moving ahead with research and refining monitoring procedures, the outline of our basic system is as follows:

1. Divide large wilderness or wildland areas into management zones or subunits.
2. Reconnaissance of individual subunits for patterns of recreation use and site impact areas.
3. Identify priority areas for management attention within subunit, design system of measurements to monitor amounts and types of use and visitors' perceptions of conditions.
4. Monitoring measurements recorded by management personnel, supplemented by research assistants.
5. Analysis of measurements, reporting, management actions, follow-up monitoring.

CONCLUSIONS

Although additional research is needed, it appears that we have the capacity to generate recreation monitoring data for large wildland areas at relatively low cost. Some changes in work requirements and retraining of field personnel will be necessary. Probably a more important need is a stronger commitment to long-term thinking about management direction, both by managers and researchers, based on long-term data collection and analysis.

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BACKCOUNTRY MANAGEMENT NORTH CASCADES NATIONAL PARK SERVICE COMPLEX*

WILLIAM L. LESTER JOHNATHAN JARVIS

INTRODUCTION

After over 50 years of debate, North Cascades National Park Service Complex (NCNPSC) was established October 2, 1968. The Complex consists of the north and south units of North Cascades National Park, and Ross Lake and Lake Chelan National Recreation Areas. It encompasses 684,244 acres of magnificent rugged alpine wilderness, as well as pristine old growth forests. In addition, there are 318 glaciers—more than half of the glaciers located in the lower 48 states. From its inception, NCNPSC was viewed as a wilderness park; the backcountry is managed primarily for its wilderness values. Increasing visitor use, particularly by climbers and cross-country backpackers, has brought human impact into even the most remote regions of NCNPSC, such as the Picket Range.

The 1964 Wilderness Act provided for the inclusion of National Park Service lands within the Wilderness Preservation System. Common with the Wilderness Act, the 1916 enabling legislation and the legislation creating NCNPSC, are the ideas that wilderness areas shall be managed in such manner that ". . . will leave them unimpaired for the enjoyment of future generations. . ."

The backcountry of most park and forest areas have been impacted by visitor use in one form or another for the past 50 years. Prior to the early 1960s, there was little use of the backcountry, many areas, other than subalpine

and alpine, had time to heal before new impacts occurred. As interest in backpacking and hiking increased, the rate of impacts exceeded the rate at which the land could recover. Until recent years there was neither the knowledge, the understanding of the problem, nor the willingness of the parks to switch priorities towards backcountry management.

Today, we are not only dealing with impacts added seasonally but also with some which occurred 50 years ago. Impacts to the subalpine are cumulative and will intensify if management is ineffective. The costs of healing the damage will increase, and we will have failed in our obligation to future generations.

When the surge of interest in backcountry recreation came in the 1960s, NCNPSC was more fortunate than other National Parks and Forests in the Northwest; the region was little known to the hiking public, and access was limited—the cross-state highway was not completed until 1972. Visitors were using areas closer to Seattle or better known National Parks such as Olympic and Mount Rainier.

That is not to say that the North Cascades were without impacts. However, damage was confined mainly to the subalpine passes which lead from one river drainage to another, and to trail-side camps (dispersed camping sites).

Vegetation impacts at Cascade Pass were severe well before establishment of the park, requiring the Forest Service to take preventative steps. By 1965, the area was closed to camping and fires. Jute netting was used to cover bare areas but patrols were infrequent and impacts continued. In 1969, Roger Contor, the park's first Superintendent, contracted with

*in Krumpke, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

Dr. Dale Thornburgh (Thornburgh 1970) to survey impacts and make management recommendations for Cascade Pass. By recognizing the importance of protecting subalpine areas, Contor set the tone for North Cascades in the field of revegetation and backcountry management. Contor sought the help of Joe and Margaret Miller to implement Thornburgh's recommendations. The Millers experimented with transplanting, on-site seeding, and the propagation of subalpine plants at their home in Bellevue, Washington. Their efforts helped bring North Cascades to the forefront of revegetation and modern wilderness management.

In a comprehensive effort to respond to past and present impacts and to apply and refine existing techniques, NCNPSC has developed a multifaceted wilderness management program. This program consists of four major components.

1. Educating visitors about safety and minimum impact through a credible information center and frequent backcountry and climbing patrols.
2. Impact Management through the application of the "Limits of Acceptable Change" system of site monitoring, backcountry permits, party size limitations, and campsite designation.
3. Human waste management through the use of a waste reduction/composting system.
4. Revegetation of impacted sites with native plants propagated in a greenhouse and in the field.

MANAGEMENT STYLE

On August 15, 1984, 541,135 acres of NCNPSC were recommended to Congress for inclusion in the National Wilderness Preservation System. However, no action has been taken on that recommendation. An additional 97,770 acres, classified as backcountry but not in the wilderness recommendations, will be managed as though it were wilderness. A total of 93% of NCNPSC is presently managed as wilderness.

To bring the backcountry function under one umbrella, NCNPSC chose to use the management system entitled, Limits of Acceptable Change (Stankey et al. 1985). A draft management plan for NCNPSC is complete and will be available for public comment later this year. North Cascades is the first park in the system to use this technique.

Backcountry permits are required for all overnight stays in the backcountry. The permit is the basic management tool for controlling the number and distribution of visitors in the backcountry. There are 96 established camps, and if travel is along the trail system, hikers or stock users must use these camps. Established camps concentrates use and leave most of the backcountry undisturbed. A well built camp will tolerate more use with less impact than a visitor chosen camp (Cole 1981). Fires are permitted only in camps where fire grates are provided, generally below 3,500 feet. Fires are not permitted in cross-country areas due to long term damage caused by fire (Schreiner 1978). It is the basic belief of upper level park management that it is our trusted responsibility to manage the wilderness in a manner that will be respected by users while at the same time will pass it on to the next generation unimpaired.

BACKCOUNTRY OPERATION

The backcountry operation is flexible and has the ability to change patrol patterns and priorities quickly. Visitor use patterns can change overnight. An article in a newspaper or magazine, or a brief mention on television can create increased use in a very specific area.

Priorities change from year to year. Revegetation, for example, may take precedence, as may patrols or monitoring, as long as the operation has the built-in flexibility to switch priorities without disrupting the total operation.

North Cascades is organized in such a manner that functions having a direct effect on the backcountry management are supervised by the Backcountry Area Ranger. These include backcountry information, patrols, revegetation and monitoring. Trails maintenance is the

responsibility of the Trails Foreman. Cooperation and coordination between the Backcountry Area Ranger and Trails Foreman is crucial to the successful operation. The interwoven and overlapping aspects of the operation result in protection of both resources and visitor services. The results over the last 10 years have been improved credibility, acceptance of management goals by visitors, and an improved resource base.

Information Center

In summer the Backcountry Information Center operates 13 hours per day and has a staff of three paid employees and two Student Conservation Association volunteers. The center is the most critical part of the backcountry operation. Maintaining credibility with a diverse user group is a difficult problem. Backcountry center visitors range from car campers looking for a camp space, to naturalists and photographers wanting information about specific habitats, to technical climbers needing up-to-date climbing route information. Our reputation has changed from that of an average information center to one with high credibility even with the most critical group—climbers.

Visitor attitudes, their acceptance of responsibilities in using the land, and support of our goals for managing NCNPSC are formed during their short encounter with the center staff. They must convey to the visitor in-depth knowledge of the backcountry, special rules, minimum impact standards and any safety problems, all while issuing a backcountry permit.

We have been successful in these goals because of a policy initiated in 1979. At that time seasonal employees were encouraged to return as rehires to the center. Their worth to the operation was emphasized and positions were up-graded. Also, work hours were scheduled so the staff could spend time in the backcountry. Our credibility and public acceptance of our program is due to dedicated seasonal employees, and our commitment to them.

Patrol Function

Patrols cover both climbing/cross-country and trailed areas. The patrol strategy is dictated as much by budget constraints as by the need to protect fragile resources. There are two less paid positions this summer than in 1980.

Patrols are concentrated mainly in heavily used subalpine areas. The chances of a visitor meeting a ranger in these areas is about 90% during weekends. Backcountry patrols are critical to the management of the wild areas of NCNPSC because they provide reliable information to the public, enforce regulations, and help maintain the unique physical and environmental resources. In the North Cascades, the backcountry staff does not follow the typical model of a group of roving rangers with separate "information specialists" manning the visitor center. Each backcountry ranger is given an area of responsibility to maintain and monitor throughout the season. These areas vary in size and types of responsibilities; for example, climbing rangers specialize in the major cross-country and alpine regions, while the Cascade Pass Ranger covers fairly small, heavily used area having less than six miles of trail. The system has several strong points. First, hazards and conditions are closely monitored throughout the season, and are easily communicated to the public. Second, when visitors meet a ranger in the backcountry, they get detailed and specific information from someone intimate with the area. Third, with roving patrols, important jobs often get left for the next ranger; here, the job is the responsibility of only one ranger. Accountability is quite high. The result of this system is excellent coverage of the entire backcountry. Less popular or more remote locations are regularly covered by a ranger, and truly remote areas receive occasional patrols to monitor the amount of use and keep track of possible future problems. The effect on the visitors and the resource since 1980 has been dramatic; the number of permitless and illegal campers has decreased, compliance has improved from 77% to more than 90%, and normally aloof climbers regularly call to ask about route conditions. Better information has

reduced the number of accidents despite the increase in climbing activity.

Once in the backcountry, the ranger has several important tasks. It is critical for the ranger to meet as many visitors as possible; contacts are important dialogues that improve the understanding of the visitor and his or her relation to the park (rangers are sensitive to visitors wishing to be left alone). Rangers insure that all visitors have a backcountry permit. During these contacts safety is always discussed, including local hazards, forboding weather, water quality, and animal problems. Principles of minimum impact camping are emphasized; it is through low impact camping that the backcountry will remain pristine. Finally, conversations often turn into rewarding dialogues, where both the ranger and the visitor may learn more about the environment. A backcountry patrol is an opportunity to gather more information about the park and current conditions. The rangers must be more familiar with their area of responsibility than anyone else. Updates of routes and hazards are radioed into the information center daily or as information becomes known. In cross-country areas, information on impacted sites is gathered and passed on to revegetation personnel for further action. Trail maintenance is also important work. Minor trail work is consistently being done. However, most work done by rangers is in the backcountry camps. Keeping camps and the backcountry meticulously clean is a priority. Visitors follow examples; camps kept clean, stay clean and thus more nearly pristine. Human waste management also occupies a large amount of time. Where soil permits, pit toilets are maintained and are moved when they fill. In subalpine areas, composting toilets handle the waste. Revegetation work occurs in coordination with the revegetation crew. Watering plants and maintaining work that has already been done is part of this job.

Backcountry patrols are often logistically difficult to coordinate. However, consistent, frequent backcountry patrols are an important key to gaining credibility with the public and maintaining a wild, more pristine backcountry.

Climbing Patrols

Climbing patrols are relatively new to NCNPSC. They began part-time in 1982 and have now expanded to two full-time seasonal positions. One position was added by separate funding and the second by converting a patrol position.

Climbing has increased 285% in 7 years. The dramatic increase is due, in part, to two new climbing guides (Cascades Alpine Guides) that cover the NCNPSC, and by word of mouth. In addition, North Cascades has two of North America's 50 classic climbs—Forbidden Peak (West Ridge) and Mount Shuksan (Price Glacier).

At the beginning of our adventure with climbing patrols emphasis was placed on climbing the major peaks to gain familiarity with the routes. There was a major credibility gap between the climbing community and backcountry staff.

To add to the problem the accident rate was out of line with similar areas. There was one accident per 250 climbers and 1 death per 750 (1979-1981). We were not, in any way, actively participating in climbing safety and only limited involvement occurred in assisting the county sheriff with rescues and recoveries. Most NPS involvement was after the fact.

By 1983 reliable basic information on the more popular climbing routes was available. To assist climbers, climbing rangers were assigned duty in the information center late Friday evenings and Saturday mornings. Climbers soon discovered that the rangers were available and began requesting them by name. A climbing display in the Backcountry Center was developed. Located on the display is a board, "Climbers Notes", where known route conditions are recorded.

Safety, both for themselves and the visitors, is the number one priority of the climbing rangers. The Backcountry Safety Action Plan was the framework used to deal with the almost insurmountable problem, (fig. 1). For the period between 1984-1986 there

Table 1. An Exerpt from the Backcountry Safety Action Plan. (Roving & Climbing & High Routes SAFETY ACTION PLAN, Saul Weisberg 7/7/84).

| Safety Item | Action | Responsibility |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Glissading | Glissading on steep snow or icy slopes in early season conditions can be hazardous. Standing giissades afford more controls: easier to turn, stop, and better visibility, and are, therefore, safer than sitting giissades on all but the steepest slopes. Knowledge of effective ice axe arrest technique is mandatory. Glissading above an inadequate or unknown runnout is not acceptable—ice or rocks on the slope can put even a simple giissade out of control. PRACTICE. | YOU SUPERVISORS TRAINING |
| Ice Axe | Your ice axe is a sharp and dangerous tool (remember Trotsky; assasination is not fun). An ice axe must be sharp to function properly in climbing situations; for self arrest purposes, a razor edge is not required. Practice so that you will not be dependent on the wrist loop for hanging onto your axe. Practice self arrest so that it is an automatic response when needed. Practice climbing on steep snow slopes with safe runnouts—practice while wearing a pack. PRACTICE EVERY TOUR UNTIL THE SNOW IS GONE. Ice axe use must be second nature to be effective: more practice makes more perfect. | YOU SUPERVISORS TRAINING |
| Routefinding | Routefinding is only a hazard when you lose your route. It happens all the time. Familiarity with your area, with use of map and compass, and common sense, keep you on the path. Stop and think before you follow that gulley that you're "almost sure goes". Take the time to examine your maps frequently—there is a wealth of amazing information hidden away between those green and brown squiggles. Learn your map; learn your area. | YOU SUPERVISORS BC INFO (for route information) |

was an average of one accident per 717 climbers and one death per 8,250 climbers (Lester 1986).

With steady work we have gained the respect and confidence of the climbing community. When it is necessary to impose stricter controls to reduce impacts we have experienced good compliance and understanding from the climbing community.

HUMAN WASTE MANAGEMENT

As visitor use increased in the 1970's and 1980's human waste management problems became critical in many subalpine areas of the park. Not only does the waste present human health hazards but it presents aesthetic and resource management problems as well. The problem has become acute in areas where trails and camps concentrate use in the subalpine. Toilet pits were dug at established camps where

visitor use was light. As visitor numbers increased at subalpine camps, the pits could not handle the use; decomposition in the pits is slow, proceeding entirely anaerobically (Weisberg 1987).

In forest areas pits are covered with a Wallowa toilet, a wooden box with a hinged lid. When the pit fills, a new hole is dug and the toilet moved. Where soil is deep and ground water is not a problem this system provides a good solution to the human waste management problem.

In most subalpine areas the soil is shallow and rocky, the surface water is high, and there is lack of suitable space for new holes. Before 1981 the solution for managing waste in high use subalpine areas was to provide a 35 gallon fiberglass vault and fly it out when full. The average annual helicopter cost was about \$2,000. To reduce the cost and helicopter time,

a modified version of the U.S. Forest Service composting system (Fay and Leonard 1978) was developed by North Cascades backcountry staff.

The system, like the USFS's, uses a plywood bin for mixing wastes and bulking agents. Unlike the USFS system it only uses peat moss as the bulking agent and does not reach thermophilic temperatures. In the true sense of the word it is a waste reduction system and not a composting system. The reduction is achieved by bacterial action.

The Skagit Waste Reduction System (Weisberg 1987) consists of a Wallowa toilet with five gallon collecting bucket. The bucket is emptied into the bin as often as needed. Seven bins are located throughout the backcountry, three of which have been in place since 1983. All sites are located about 4,500 feet, with one at 6,000 feet. An estimated 2,000 gallons of waste has been reduced in the past five years, including 50 gallons removed from the backcountry. Because the system doesn't reach thermophilic temperatures, the end product is not safe to dispose of in the field. Experiments are being conducted this summer that may enable the system to reach thermophilic temperatures.

This system, though not perfect, does provide a very satisfactory method of handling a very difficult problem. Human waste management, if it is not already, will be one of the most urgent problems facing wilderness managers in the future.

MONITORING PROGRAM

A critical part of the Limits of Acceptable Change (LAC) management system, or any management system, is a method of monitoring that gives systematic feedback for determining how well management actions are working.

Line-intercept transects (Weisberg 1985) are used both for monitoring the 96 established camps and the 115 known impacted sites. Two computer programs for analyzing data have been developed in the park. The Line Transect program analyzes total plant cover, percent of individual species cover compared with other species, and bare ground (Figures 2, 3).

Impacted sites are monitored on a three year rotating cycle.

The Campsite Monitoring program measures total bare ground and disturbed vegetation. Graph programs outline the camp sites in relation to established fire grates (Figure 4). Camps will be monitored on a five year rotating cycle.

REVEGETATION EFFORTS

Revegetation efforts at Cascade Pass were started shortly after the establishment of the park. The Millers experimented with direct seeding and plug transplants (Miller 1976) with only limited success. Taking plant material from surrounding meadows left the limited meadow areas "moth eaten".

The Millers found that it was possible to propagate plants from the Pass in their greenhouse near Seattle. Division and cuttings techniques were used to produce several hundred individuals of *Carex spectabilis*, *Luetkea pectinata*, and *Sibbaldia procumbens*. Plants were carried back to the Pass next fall and transplanted. Survival rate was about 85%.

With their success, the Millers were able to convince NCNPSC to build a small A-frame greenhouse. In 1981 a permanent 20x40 foot greenhouse was constructed. Annual production is now about 5,000 plants.

In the subalpine, few sites are revegetated using material from surrounding areas due to the lack of large meadow areas. Where possible plant material is salvaged from trail reconstruction work. Every effort is made to coordinate schedules of the revegetation crew with trail projects.

Subalpine areas show promise of continued recovery once sites are closed and initial transplanting takes place. Monitoring of subalpine sites show an increase of total vegetative cover by 35% over an eight year period (Figure 4) (Weisberg 1987).

Of the 42 impacted sites at Cascades Pass recorded by Thornburgh, 20 have been fully

revegetated and of the other 22, all but three are 50% recovered. 55,000 plants propagated in the greenhouse have been planted as Cascade Pass.

Revegetation is a total commitment on the part of the backcountry staff. Efforts are ineffective if visitors fail to understand or appreciate what you are trying to do.

Constant patrols and visitor education have proven to be the most effective means of preventing other impacts and protecting rehab sites. If patrols or education is ineffective ten years of effort can be lost overnight by a single camping party.

GREENHOUSE PROPAGATION OF NATIVE PLANTS

The Marblemount greenhouse is 20x40 feet, cedar framed, unheated and covered with corrugated fiberglass. There is a total of 480 square feet of propagating space in the greenhouse and over 500 square feet outside. It is equipped with an automatic misting system and heat mats are used in the spring for bottom heat during propagation.

Until this spring, an average of 5,000 individual plants had been propagated annually from May to the end of August. *Luetkea pectinata*, *Sabbaldia procumbens*, *Vaccinium spp.*, *Phyllodoce empertriformis*, and *Spiraea densiflora*, are grown from cuttings. *Carex nigricans*, *C. spectabilis* and *C. illota* are propagated by division.

Few subalpine plants have successfully been propagated from seed. A new technique for propagating a variety of subalpine plants was discovered, somewhat by accident. Seeds of *L. pectinata*, *Spiraea densiflora*, *C. nigacans*, *C. spectabilis*, and *C. illota* were collected in mid-September and stored in the greenhouse until the first of March. The seeds were then sown on the surface of a commercial potting soil. The soil was maintained at 29 degrees C and covered with plastic to maintain humidity.

Once soil temperatures reached 29 degrees C seeds germinated within 5 to 8 days. Germination of the 3 *Carex* species are

estimated at 35%. Germination of *Spiraea* was higher, *Luetkea* was less successful.

Test plots using techniques gained from the greenhouse experience were established as Cascade Pass in July of this year. Soil temperature was maintained using clear plastic sheets, creating the effect of a mini-greenhouse. High humidity was achieved by spraying water daily under the plastic using a bladder bag.

Data has not been totally analyzed but initial results indicate that it is feasible to propagate large numbers of the above subalpine plants in the field. If the final results prove to be favorable, it will change the way and amount of revegetation that can be done in the field.

Gene pools are protected. Seeds and plants for propagation are collected only from the site to which they will be transplanted.

The greenhouse can only produce a fraction of the plant material needed to repair impacted sites. We have shown that resource repair can be done using plants raised in the greenhouse and that it will continue to be a valuable tool for restoring pristine backcountry conditions.

CONCLUSIONS

North Cascades integrated backcountry operation has the built-in flexibility required to manage a large wilderness area. Safety programs have resulted in fewer accidents and fatalities, while climbing has increased. Improvement in information and patrols have increased our credibility and reduced impacts. The use of composting/waste reduction toilets have drastically reduced the accumulation of human waste in the backcountry. Vegetation monitoring, combined with an active revegetation program, is reclaiming impacted areas. With continued hard work and innovation, the outlook for the wilderness backcountry of the North Cascades is bright. With an increase in annual visitation of over 100% since it's establishment, the backcountry resource is less impacted today and will see continued improvement in the future. Future

generations will find in North Cascades an unimpaired wilderness legacy.

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WILDERNESS MANAGEMENT IN THE SIERRA NEVADA, CALIFORNIA: 23 YEARS OF INTERAGENCY COOPERATION*

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The Sierra Nevada mountain chain extends for over 300 kilometers through the state of California, USA, with numerous peaks over 4,000 meters high. The central and southern portions of the mountains are crossed by only one highway, the Tioga Road in Yosemite National Park. This magnificent area is currently protected in 13 wilderness areas in three national parks and five national forests (figure 1). The National Park Service and the Forest Service cooperatively administer this wilderness complex to benefit the user while preserving the resource in as natural a state as possible. This cooperation has evolved over many years.

The nation's first preserve consciously designed to protect wilderness was established in 1890 when the mountains above Yosemite Valley become a national park (Nash 1967). Wilderness management in those days consisted of removing sheep and cattle trespassers, eliminating predators, and extinguishing fires. Users of the wilderness were few and needed only minimal agency support. For the next seventy years, little cooperation between park and adjacent forest managers was felt to be necessary. Increasing visitor use and official designation of wilderness areas would change the way both agencies managed their lands.

PAST CONDITIONS (PRE-1964)

During the 1930's, primitive areas were administratively designated on the five national forests surrounding Yosemite and Sequoia

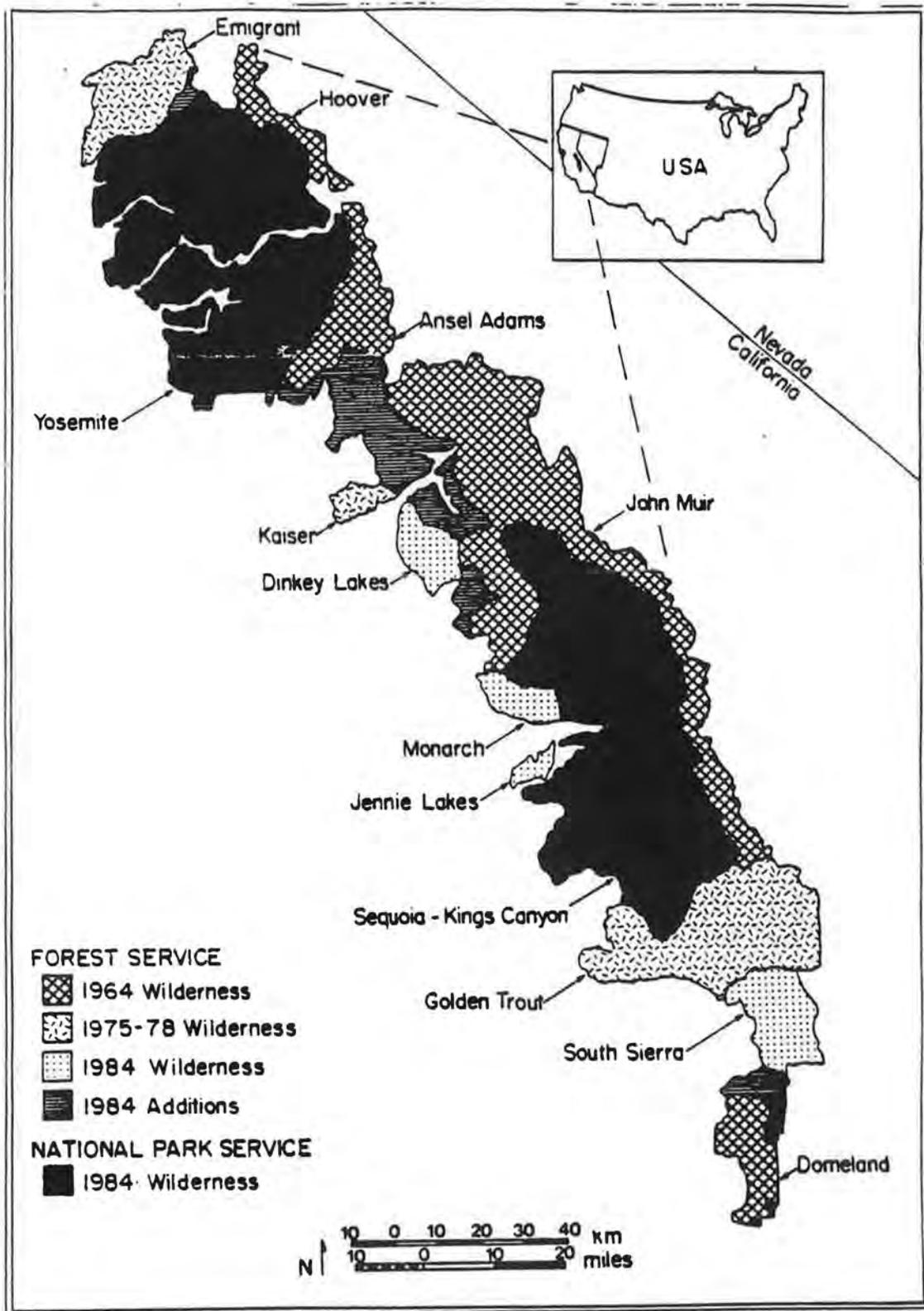
National Parks. These included the Emigrant Basin on the Stanislaus National Forest, the Hoover on the Mono (now Toiyabe) and Inyo National Forests, the Minarets on the Sierra and Inyo National Forests, the High Sierra on the Sierra, Sequoia, and Inyo National Forests, and Dome Land on the Sequoia National Forest. Sequoia National Park was expanded to include the Kern Canyon in 1926, and Kings Canyon National Park was established in 1940. This new park, which is still largely untouched by roads, included a portion of the High Sierra Primitive Area.

One of the first analyses of conditions in the Sierra Nevada wilderness was done by Sumner (1936). He noted overgrazing by recreational as well as domestic stock as the most common direct form of impact. More insidious, he warned, was the indirect impact of increased access through roads and trails. Sumner (1942) was also the first to define recreational carrying capacity by stating that the recreational saturation point "denotes the maximum degree of the highest type of recreational use that an area can receive, consistent with its long-time preservation, and beyond which any further use would impair the essential qualities of the area."

A study of the problems and management of wilderness was initiated on the High Sierra Primitive Area in 1953 (Snyder 1966). He concluded that the most critical problem facing wilderness managers was the location and condition of trails. Secondary problems included camping litter, campsite dispersal, recreational stock impacts, tree cutting, and management facilities. These problems raised the specter in his mind that someday managers might have to place limits on total use, or length of individual stay, or both. Snyder also

*in Krumpke, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Preserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

Figure 1. Wilderness areas in the central and southern Sierra Nevada Mountains, California, USA, by agency and year designated.



speculated that mandatory permits and a possible fee might become necessary.

TRANSITION PERIOD (1964-1983)

With the passing of the Wilderness Act in 1964, the Hoover, Minarets, and Dome Land areas became legislated wilderness. One part of the High Sierra Primitive Area, which was split into two areas by the creation of Kings Canyon National Park, was designated the John Muir Wilderness, while the remainder was left as a primitive area. No National Park areas were designated by the Act although the National Park Service was required to review all potential areas and make recommendations to Congress within ten years. Proposals for Yosemite and for Sequoia and Kings Canyon were submitted in 1972. The National Park Service managed those areas as de facto wilderness.

In 1975, Congress designated most of the Emigrant Basin Primitive Area as wilderness but left out a portion pending further study. The Kaiser Wilderness on the Sierra National Forest was designated in 1976 and the Golden Trout Wilderness on the Sequoia and Inyo National Forests was added in 1978.

Dramatically increasing use during the late 1960's alarmed managers from both agencies and steps were begun to address the problem through a coordinated approach. As a first step, the Forest Service initiated a wilderness permit program in 1971 to gather data on current use levels for all of their wilderness and primitive areas in California (Elsner 1972). In 1972, the National Park Service joined the Forest Service, requiring permits for overnight use in the backcountries of Lassen, Yosemite, Sequoia, and Kings Canyon National Parks. An important aspect of this combined program was that visitors to contiguous areas, be they wilderness, primitive, or park, needed to obtain only one permit from the agency office where the trip originated. Similarly, users of the John Muir or Pacific Crest Trails could use a single permit for their trips. Data from the permits chronicled the increasing use: in Yosemite alone the number of permits issued went from 13,477 in 1972 to 22,111 in 1976.

As an outgrowth of the joint permit effort, annual meetings between managers of the two agencies in the central and southern Sierra Nevada were started in 1973. These gatherings were used to discuss and resolve issues of mutual interest such as permits, use limits, signing, trails, stock use, and impact monitoring. At various times, members of conservation groups and the public were invited to attend these meetings to get their ideas and input. In addition to promoting a cooperative effort, this group also produced several interagency brochures designed to positively affect user behavior in the wilderness (DeGraff 1983).

The decision to limit use was first based on field observations, public complaints, and impact inventories. For instance, a survey of backcountry conditions in Yosemite found trampled vegetation in the most popular areas, multiple trails throughout the backcountry, and over 200 people camped at an alpine lake (Holmes et al. 1972). Similar evaluations in Sequoia and Kings Canyon National Parks and in the John Muir and Minarets Wildernesses on the Inyo National Forest convinced managers that the time for use limits had arrived.

In 1973, Yosemite started restricting use by travel zone limits. The use limit for each zone was determined from the area of the zone, the number of miles of trail it contained, its ecological fragility, and social density standards (van Wagendonk 1986). The first use limitation for the Inyo National Forest was for the Mt. Whitney Trail in the John Muir Wilderness in 1974. The trailhead quota was based on the number of acceptable campsites in the travel zone, the average length of stay, and the ability of the agency to manage human waste. Two years later, Sequoia and Kings Canyon implemented an interim trailhead quota program designed not to exceed the 1971-1972 use levels until numbers based on studies could be provided (Parsons 1986). Where appropriate, these quotas were administered jointly with the John Muir Wilderness at the trailhead rather than at the Park boundary since most of the public did not draw a distinction between park and forest land (DeGraff 1983). The Sierra National Forest initiated quotas on

their wilderness areas in 1981 (DeGraff 1983). The Toiyabe National Forest began using quotas in the Hoover Wilderness in 1983 only for people entering Yosemite National Park.

At the same time that limits were being imposed, research studies on ecological and sociological impacts of wilderness use were initiated. Lee (1977) and Absher and Lee (1981) analyzed sociological aspects of use in Yosemite while Kantola (1975) did a similar study in Kings Canyon National Park. Forest Service studies paralleled this work on the Minarets Wilderness (Habermehl 1974). In general, these studies concluded that the range of social norms and settings was so diverse that no definitive limits could be derived. Ecological studies also concluded that the relationship between use and impact depended on numerous other variables (Parmeter 1976). Decisions about acceptable levels of impact and use had to be based on the best available information but still remained subjective.

The next phase of the research effort was designed to develop methods for inventorying impacts and determining trailhead quotas. Parsons and MacLeod (1980) measured impacts using visual criteria to quantitatively evaluate the level and extent of impacts in the Sequoia and Kings Canyon backcountry. These data were used as a basis for determining wilderness use capacities for both parks (Parsons 1986) and for trail use quotas in the Mineral King area (Parsons et al. 1981). Armstrong (1974) determined zone capacities for the Bishop Creek drainage of the John Muir Wilderness based on the ability of a zone to accommodate overnight users and related that use to trailheads. For areas such as Mineral King and Bishop Creek, where a single trailhead leads to one or two zones, quota calculations are straightforward. Complex networks involving travel through several wilderness areas required more sophisticated analysis.

The QUOTA program developed in Yosemite handles these complexities by using a simulation approach (van Wagendonk and Coho 1986). This program was first used to calculate trailhead quotas for the Yosemite backcountry and the surrounding Emigrant, Hoover, and

Minarets Wildernesses. Quotas were implemented in Yosemite in 1977 (van Wagendonk 1981). The Inyo National Forest first used the QUOTA program in the Minarets and John Muir Wildernesses in 1980. In Sequoia and Kings Canyon, trailhead capacities determined by QUOTA were implemented in 1982 (Parsons 1986). Since QUOTA uses travel patterns based on wilderness permits, changes in anticipated itineraries had to be considered. This was done by adjusting zone capacities or use levels to account for differences between actual and planned use (van Wagendonk and Benedict 1980, Parsons et al. 1982). The system of limiting use in the Sierra Nevada would have been impossible without the close cooperation of managers and researchers.

FUTURE DIRECTIONS (1984-??)

The California Wilderness Act of 1984 brought the amount of designated wilderness in the central and southern Sierra up to nearly 1.2 million hectares (table 1). This was done by expanding the Emigrant, John Muir, Minarets, and Dome Land Wildernesses, adding the Dinkey Lakes, Monarch (the remnant of the High Sierra Primitive Area), Jennie Lakes, and South Sierra Wildernesses, and including the backcountries of Yosemite, Sequoia and Kings Canyon National Parks. The Act also renamed the Minarets the Ansel Adams Wilderness to honor the world-famous photographer who captured the essence of Sierra Nevada wildness.

This new era of wilderness management brought new and refined techniques with it. Computers were first used for wilderness permit reservations on the John Muir in 1984, Sequoia-Kings Canyon in 1985, and Yosemite in 1986. This effort will be expanded in the future to include on-line permit issuance on an interagency basis. Monitoring procedures have been refined and complete inventories of impacts are occurring on several areas (Parsons and Stohlgren 1987, Sydoriak 1986). Once results from these inventories are compiled, zone capacities and trailhead quotas will be

Table 1. Wilderness areas in the central and southern Sierra Nevada Mountains, California, USA, by agency and year designated.

| WILDERNESS AREA | 1964 | 1974-78 | 1984 Hectares | TOTAL |
|------------------------------|----------------|----------------|------------------|------------------|
| <u>Forest Service</u> | | | | |
| Hoover | 17,327 | | | 17,32 |
| Ansel Adams | 42,668 | | 48,175 | 92,843 |
| John Muir | 202,438 | | 32,791 | 235,229 |
| Dome Land | 25,377 | | 12,954 | 38,331 |
| Emigrant | | 42,965 | 2,469 | 45,434 |
| Kaiser | | 9,190 | | 9,190 |
| Golden Trout | | 123,662 | | 123,662 |
| Dinkey Lakes | | | 12,145 | 12,145 |
| Monarch | | | 18,217 | 18,217 |
| Jennie Lakes | | | 25,504 | 25,504 |
| South Sierra | | | 4,251 | 4,251 |
| Subtotal | 289,810 | 175,817 | 156,506 | 622,134 |
| <u>National Park Service</u> | | | | |
| Yosemite | | | 275,752 | 275,752 |
| Sequoia-Kings Canyon | | | 298,394 | 298,394 |
| Subtotal | 0 | 0 | 574,146 | 574,146 |
| Total | 289,810 | 175,817 | 730,652 | 1,196,280 |

adjusted or special use restrictions implemented.

Although most of the problems identified by Snyder (1966) in 1953 still exist in some form, steps have been taken to mitigate them. Parallel trails and erosion gullies have been replaced with rock causeways, a technique pioneered in Yosemite (Snyder 1978). Requiring wilderness users to pack out what they pack in has gone a long way toward solving the litter problem. Problems associated with campsites such as human waste, firerings, and soil compaction are being dealt with by interagency minimum impact programs, patrol rangers, and site restoration efforts. Stock use and its associated impacts continue to be a controversial topic. In 1986, the interagency manager's group met specifically to deal with stock. One approach has been to develop a site-specific meadow management plan while other areas have tried to deal with the stock user directly. The excessive cutting of trees for camp construction has been minimized through

education efforts, while fuel wood collecting is dealt with using no-fire zones. Administrative activities and facilities remain unresolved issues facing wilderness managers today. There still are differences in the way each forest and park interprets wilderness legislation and agency policy.

Future manager meetings will address these as well as new emerging problems. In addition, communication networks will be established to facilitate communication and cooperative training sessions will be held to foster better understanding.

CONCLUSION

The innovative approach used by the Forest Service and National Park Service to manage wilderness in the Sierra Nevada serves as a model for interagency and international applications. Diverse management objectives of different agencies for large numbers of areas can be resolved through cooperation.

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NO WILDERNESS MANAGEMENT: PARTNERSHIPS WITH A DIFFERENCE*

JUDITH LAMBERT

We in Australia do not have any designated wilderness, so until now we have not been able to work with governments in the management of our wilderness. Ours have been partnerships in identification and protection of some of our most precious and special areas; areas of World Heritage quality.

With the growth of the conservation movement and public awareness of the need to protect the diverse array of wilderness areas in Australia, we in The Wilderness Society and other major conservation organizations have worked with our governments in two quite different ways.

Much of this co-operation has been with the Federal government. Since State governments in our country are primarily responsible for all forms of land management, it would be rewarding to work closely with them as well, but until now that has generally been more difficult. Nevertheless, as our credibility rises and our campaigns gain growing public support, our partnerships with both the Federal government and some of the State governments are strengthening.

Over the past 5 to 10 years The Wilderness Society has worked with the Federal government in Australia in ways with which many others in the conservation movement are familiar. We have frequently taken the initiative, provided the basic research and been responsible for the public education necessary to have the value of a wilderness area and the threats to it identified.

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We have also been responsible for researching economic and employment alternatives for those affected by the protection of wilderness areas.

This work has been done both through the role of our National Liaison Officer working with politicians and senior government officials in the national capital, Canberra and more especially through the work of a team of paid and volunteer supporters from across the country. These are people with a diverse range of specialist skills from many professional backgrounds.

It is gratifying that over the years the government has come to accept this work and at times even to solicit our input, but at the same time it is frustrating to find that even now they wait for us to take that initiative. I think it would be fair to say that none of the successes in environmental protection in Australia would have happened without the nongovernment organizations placing them on the political agenda and providing the background research. Often work which should be done by an environmentally responsible government is left for The Wilderness Society and colleagues in other conservation groups to do, at small cost to our governments. They get good research and public education at low prices from us.

Our second type of partnership with Federal governments has been a less traditional one and one which has evoked much discussion and soul-searching both within The Wilderness Society and throughout the conservation movement. On two occasions we have taken a stand in support of a major political party, and have actively campaigned for that party in the lead-up to a Federal election.

The decision to form such an alliance and to participate in the party political process has not been taken lightly. The Wilderness Society has decided to take such a stand only when:

- the future of an area of major environmental significance is at stake,
- one political party has taken very real initiatives to protect that area, while the other party has not. (Australia has essentially a two-party political system, in which minor parties have only limited impact),
- the chances of having an impact on the election outcome are high.

On those occasions The Wilderness Society and Australia's other major conservation organisation, the Australian Conservation Foundation, have joined forces to make protection of the natural environment a significant issue in the election campaign. In those campaigns we have produced our own election material, run public meetings in targetted marginal electorates across the country, placed the area at stake on the media agenda and printed our own how-to-vote advice.

In 1983 the "No Dams" election campaign was the culmination of a long fight to save the Franklin River in Tasmania's South West wilderness. The support of tens of thousands of ordinary Australians across the country, and especially in targetted electorates, was responsible for the election of the Hawke Labor government, which included in its election platform a promise to protect the river. That campaign represented a turning point in the role of the conservation movement in Australia.

The credibility gained in the Franklin campaign has recently been reinforced. In the lead-up to the July 1987 Federal election, The Wilderness Society and the Australian Conservation Foundation again decided to take a stand. This time the future of native forests across the country was at stake. The Queensland State government was allowing destruction of our tropical rainforests, forests already shown to fulfill all four criteria for World Heritage listing. Added to that, the term of the next Federal government will see

decisions made about export woodchip licenses for native forests in almost all states.

In the course of the election campaign Prime Minister Hawke made a long overdue commitment that a Federal government under his control would protect the tropical rainforests. The "Vote for the Forests" campaign run by the conservation organizations was again sufficient to influence the outcome in several marginal electorates, and this time political parties of all persuasions acknowledged that the environment vote is significant.

These decisions to become involved in party politics were made with ponderous deliberation, but as a carefully researched and selectively used technique, they are effective. Since the most recent Federal election, the more conservative major party has shown a new willingness, in fact almost an eagerness, to talk with us. We look forward to the day, perhaps still in the distant future but perhaps closer, when sound environmental protection will be a bipartisan policy.

At that time we can divert our energies to the partnerships in management which some of our colleagues in the USA enjoy today. To be involved in the designation and proper management of wilderness areas across Australia must surely be one of our ultimate goals.

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INTERNATIONAL COOPERATION IN FRONTIER REGIONS: THE ABCY REGION CASE STUDY*

GLENN T. GRAY

INTRODUCTION

This study focuses on cooperative efforts between Canadian subnational jurisdictions and Alaska. Throughout the world, international cooperation generally occurs in reaction to specific conflicts. The relatively undeveloped North provides an excellent opportunity for nations to cooperate in proactive international planning before major transboundary problems surface. The specific area of this study encompasses the region where Alaska, British Columbia and the Yukon Territory meet. For reasons of simplicity it will be referred to as the ABCY Region.

The purpose of this study in international regionalism is to examine existing institutions for cooperation and to recommend new ones. This paper begins with a description of the region including a brief synopsis of the major issues. Next, reasons for cooperation are outlined. A discussion of similarities and differences between the two countries is followed by a history of the relations of the people of this region. Avenues for international cooperation are then discussed. The paper concludes with recommendations for shaping future international relations.

This paper is a summary of a more in-depth study which closely examines the situation in the Stikine River basin. This river basin is located in B.C. and Alaska. The recommendations are a result of over two years of research. Information was obtained from literature searches, computer data bases,

government archives, personal interviews and written correspondence.

THE CONCEPT OF REGIONS

A region is a flexible concept. Regional boundaries may be manipulated to serve almost any purpose. A wildlife biologist's region is based on habitat and migration patterns. A hydrologist's region is delineated by watersheds. A geologist, on the other hand, is more concerned with patterns of mineral deposition. International borders often slice through other kinds of regions creating an artificial barrier to a whole system outlook.

The boundaries of the ABCY Region chosen for this study include portions of the government jurisdictions along the international border. This proposed administrative region includes several distinct natural regions. The Japanese current moderates extreme temperature changes along Southeast Alaska and provides a substantial amount of rainfall. The rugged mountain ranges that mark the international border separate the coastal rain belt from the drier and colder Interior. A few river basins pierce this formidable barrier providing gateways to the Interior.

An impressive array of natural features may be found in the ABCY Region. North America's second highest peak, in Kluane National Park, is adjacent to the world's highest concentration of tidewater glaciers in Glacier Bay. The highest density of bald eagles and brown bears also occurs in the region. Canada's most impressive canyon is located near the steep volcanic peaks of Mt. Edziza Provincial Park in the Stikine River basin. Fish and wildlife migrate throughout the region ignoring national borders. Five species of salmon spawn in the rivers. Bear, moose, sheep, mountain goats and wolves inhabit the entire region. Caribou may be found in the Canadian

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portion of the region while humpback whales travel through the waters of Southeast Alaska.

ISSUES

The ABCY Region is mostly de facto wilderness. Several National Parks, federally designated wilderness areas, provincial and state parks do exist but most of the land is open to resource development. The major international issue is how much cooperation should occur while maintaining sovereignty and separate identities. Resolution of future resource development conflicts will be dependent upon the status of the cooperative effort.

Major international issues in the ABCY Region ebb and flow. They range from the contended maritime boundary at its southern extreme to customs problems in the North. Proposals for hydroelectric developments, transportation corridors, allocation of fisheries, and establishment of wilderness areas are all sensitive issues. Mineral, oil and gas developments will become more important in the coming years. Competition between the countries for export of similar goods also presents problems. Another related issue is the importation of goods at the expense of one's own resource sectors. A problem that will be more noticeable in the future is that existing institutions are insufficient to deal with problems simmering across the border.

This study focuses on the process of cooperative decision making. Judgments of how much wilderness is needed or what kind of development is best are beyond the scope of this paper. The research has instead focused on mechanisms which improve communication and coordination across the border.

WHY COOPERATE?

Cooperation in transboundary regions is suggested for a number of purposes. First, early development of cooperative relationship creates a framework for resolving more sensitive issues in the future. Second, many land use designations are mutually exclusive. Once one option is chosen other opportunities are foregone and the character of the area may be permanently altered.

Wilderness is a nonrenewable resource and the choice to develop it should be an informed one. Multi-jurisdictional cooperation along the border provides checks and balances helpful in the decision making process. Third, resource developments in one country can have profound effects on the other country. Fourth, cooperation can also lead to more compatible land use designations along the border. Fifth, economies of scale may make it more feasible to undertake joint developments rather than by one jurisdiction alone. Lastly, cooperation in data gathering and exchange of information will also lead to a reduction in duplication and foster better relations.

CANADIAN - U.S. RELATIONS

The longest border in the world exists between Canada and the U.S. These two countries engage in the largest bilateral trade of any nations. Their relations are often cited as a best case scenario (LeMarquand 1977, Sadler 1986, Souto-Maier 1981). Both governments are federated democracies. They share a similar language and culture but subtle differences separate their identities and affect cooperation.

Both Canada and the U.S. are "Children of the Same Mother." The U.S. broke away from Great Britain with a bloody revolution. Canada's independence was attained more gradually beginning with the British North America Act in 1867, and culminating with the Constitution Act of 1982. Canada still remains a member of the Commonwealth. The abrupt separation of the U.S. from Great Britain enabled government leaders to modify the parliamentary system. Writings of Montesquieu (1823) influenced the American decision to institute a separation of powers between the legislative, administrative and judicial branches of government. In Canada, the parliamentary system has been retained and elected government leaders are also responsible for administration of the ministries. The Canadian Cabinet may also act in a legislative manner that is not possible in the U.S. by a mechanism known as an order-in-council.

The two countries also differ in the power given to their subnational authorities. Canadian provinces have jurisdiction for the management of most natural resources. Provinces also have the ability to complete treaties that concern topics within their jurisdiction. U.S. states are prohibited by the Constitution from entering into many kinds of compacts and agreements. The 88th Congress relaxed this prohibition somewhat but in general the federal government must be involved in many kinds of written agreements.

Public access to government also differs between the two countries. The U.S. generally places more emphasis on public involvement while Canadians are more accepting of a strong government. The judicial branches of the two nations also have different approaches. It is easier in the U.S. to get "standing" in court cases to challenge the government than in Canada. The Legislative branch is also more susceptible to lobbying efforts in the U.S. Canadians sometimes travel to Washington D.C. to influence legislation.

The perspective towards wilderness differs on either side of the boundary. Eighty percent of Canadians live within 100 miles of the border. Canada's prime development is in the south while true wilderness is perceived to be in the North. In the U.S., much of its wild lands are along its northern border. Recent years have brought increased conflicts in areas such as the Stikine River Basin where the U.S. has a designated wilderness while resource development occurs just over the border.

HISTORY OF COOPERATION

Cooperation in the ABCY Region has occurred throughout recorded history. The first instances of cooperation within the region began between the Natives of the Interior and the Coast. Tlingit legends reflect the belief that their ancestors migrated through river basins under glaciers to what is now Southeastern Alaska (Garfield 1947). The more powerful Tlingits dominated bilateral trade negotiations with the Interior Indians several times each year

(Krause 1956, Swanton 1909, Boas 1966, Duff 1964, Dawson 1888). The close association between the two sovereignties are evidenced by similarities in songs, dances and language.

The fur trade brought Russian, French, Spanish, British and American adventurers to the region. These nations were involved in a series of negotiations leading to allocation of the fur resource. The Russian rule of the coastal portion of the region was administered by the Russian American Company, while the Interior was controlled by the Hudson's Bay Company. Russian holdings in Alaska were sold to the U.S. in 1867 and this marked the first time government had a strong presence in the area (Tripp 1975).

Additional resources replaced the economic importance of the fur trade once sea otter populations were decimated. The discovery of gold in the region triggered several booms and an unequalled migration from the south. Development of other minerals, timber, government spending, trapping, and tourism fuel the economy today.

The economic history of this region is similar to other Northern regions. Raw materials are exported and finished products are imported. The economy is largely dependent on outside capital and local income is leaked through purchases of goods. Booms are inevitably followed by busts.

AVENUES FOR COOPERATION

The possibilities for cooperation across the border are immense. U.S. federal, state and local entities may communicate with Canadian federal, provincial, territorial, regional and local entities. Private corporations, interest groups and professional organizations add further opportunities for cooperation. International cooperation ranges from simple exchange of information to joint planning and management of resources. Written agreements range from non-binding memorandums of understanding to formal treaties requiring years of negotiation and ratification by the U.S. Senate. Former governor of Maine Curtis, a one-time commissioner of the International Joint Commission, found that: ...

the most effective interactions are those based upon a handshake rather than upon written unenforceable agreements (Curtis and Carroll 1983,).

In the U.S. portion of the region, the major federal land managers are the U.S. Forest Service and the National Park Service. Most of Southeastern Alaska is within the Tongass National Forest and is managed by the U.S. Forest Service. National Parks in the region include Glacier Bay National Park and Preserve, Wrangell-St. Elias National Park and Preserve, Klugane National Park and the Klondike Goldrush National Historic Park.

Canadian federal authorities have more responsibility in the Yukon Territory than in B.C. The federal government is responsible for salmonids in both jurisdictions but has little authority for management of other B.C. resources. In the Yukon, the federal government exercises much control through the Department of Indian and Northern Affairs. Parks Canada is responsible for management of national parks. More power was ceded to the territorial government in 1978 and the elected government leader gained more authority (Spitzer 1987).

Cooperation between the federal governments is generally accomplished through the U.S. Department of State and External Affairs Canada. Other federal mechanisms for cooperation include the Canada-U.S. Interparliamentary Group. This joint body of legislative personnel met Anchorage in 1979 to discuss trade, energy and environmental concerns. The International Joint Commission (IJC) is an independent body set up by the 1909 Boundary Waters Treaty. The Commission works closely with the Department of State and External Affairs Canada. The IJC hasn't been involved with conflicts along the Alaska-Canada border but there has been some discussion of possible future referrals (Taylor 1984, Clark 1987). The U.S. National Park Service and Parks Canada cooperate in the ABCY Region. Yearly meetings occur between Klondike Gold Rush National Historic Park and Chilkoot Trail National Park officials. It is also likely that the parks will be given international park status in the future (Alderson 1987). The Pacific Salmon

Commission is a federally appointed institution for joint management of a portion of the salmon fisheries. The attention placed on overall bilateral relations is unbalanced. Canada directs more emphasis on the relationship than the U.S. does (Curtis and Carroll 1983, Sewell 1986). U.S. federal-provincial relations are an important link in the ABCY Region. As previously mentioned, the U.S. Federal government manages most of the land in Southeast Alaska while B.C. is responsible for resource management in that province. Officials of these governments have met to discuss matters such as forest protection, power developments, and transportation corridors.

State-provincial-territorial cooperative institutions in North America were pioneered with the Alaska-Yukon-British Columbia Conference in 1960. The original goal of this effort was to plan for joint development of water, mineral, power and forest resources in the region as well as exploring options for Canadian port development in Alaska. Two more meetings were held in the early 1960s until relations were hampered due to a personality conflict between Alaska's governor and B.C.'s premier (Johansson 1976). These meetings were reestablished in the mid 1970s. The addition of the Coordinating Committee strengthened ties between the three governments. Topics were expanded to include such varied issues as communications development, oil tanker traffic, education, public involvement and alcoholism. During the 1982 heads-of-state meeting, the Stikine-Iskut Rivers Information Exchange Committee was established in reaction to the power development proposal. This is an example of a formal mechanism for information exchange. In recent years, less emphasis has been placed on the heads-of-state meetings. They have been permitted to lapse several years and meetings that do occur are not well documented. Another means of cooperation between subnational entities occurs through legislative delegation exchanges. Yearly meetings between the legislative assemblies of Alaska and the Yukon occur. These meetings usually involve informal information exchange but may also focus on specific issues. Local governments also cooperate occasionally. A link

between the capital cities of Alaska and the Yukon has recently been strengthened. On September 8, 1987, a meeting between the Whitehorse Council and the Juneau City and Borough occurred. Discussion revolved around developing a joint economic strategy, establishing an electronic mail system between the Mayors' offices, educational exchanges, improving air connections and establishing direct mail service (Polly 1987).

Cooperation also occurs between private organizations. Corporations have interests across the border, professional organizations meet together, chambers of commerce sometimes cooperate and environmental groups sometimes work together. A notable cooperative effort occurred in 1985 when representatives of B.C., Yukon and Alaskan environmental groups held a meeting about the Stikine River basin. These groups invited government agencies in one of the only attempts to view the watershed as a single unit. An Alaskan coalition of environmental groups has also proposed an international park jurisdiction for the watershed.

Canada and the U.S. have been regarded as having some of the most amicable relations in the world. It is generally agreed, however, that these two countries likely won't cede much of their sovereignty to joint bodies (LeMarquand 1977, Scott 1974). It has even been speculated that the Boundary Waters Treaty would be impossible to negotiate today. Utton (1973) also foresees open ended flexible agreements and describes river basin commissions as largely unrealistic.

RECOMMENDATIONS

The present ad hoc system of cooperation and communication between the governments won't prepare them for likely future problems. Sadler (1986) recommends that ad hoc cooperation be replaced with: -an overall system for conflict settlement -a flexible form of umbrella understanding in which broad principles and obligations are stated in general terms (375).

Curtis and Carroll (1983) also specify a need to place more emphasis on Canadian-U.S. relations. A more structured approach is also necessary in the ABCY Region to prevent lapses in communication due to personality conflicts and postponement of meetings.

It is recommended that a broad memorandum of understanding be negotiated by the major government agencies responsible for land management in the ABCY Region. The memorandum of understanding should specify how and when cooperation will occur while retaining flexibility to experiment with new institutional innovations. It is recommended that the agreement establish a commitment for yearly meetings of the trilateral heads-of-state. If a physical meeting becomes impractical, an audio or video teleconference could easily be arranged.

In addition to the heads of-state meetings, it is recommended that the Coordinating Committee active in the 1970s be reinstated. This group may wish to appoint subcommittees to deal with specific issues such as: joint energy concerns, mineral development, forestry harvest and protection, transportation issues, wilderness-tourism issues, fish and wildlife management and perhaps even cooperative economic development. Establishment of a citizen advisory committee would also provide an opportunity to obtain ideas from the general public. Along with creation of a coordinating committee and subcommittees, it is recommended that the agreement include an open door policy for communication between on-the-ground managers. Alaska Governor Egan offered such a policy to the B.C. premier in 1972. A list of government officials educated in transboundary issues would also be helpful to circulate.

Local cooperation should also be encouraged. The OECD Secretariat (1979) recommended that local cooperation in transboundary areas be expanded. An advantage of local cooperation is the lack of linkage to unrelated issues far removed from the region.

The memorandum of understanding should also establish regional conferences. It is

recommended that the ABCY region be divided into more manageable regions for international cooperation: the Stikine, Taku, Upper Yukon and Klwane regions. The purpose of the conferences would be to introduce planners and managers to each other and to foster conceptualization of the international region as a whole system. It is unlikely that serious problems could be solved during a three day conference but the meeting would be an excellent opportunity to begin a proactive international planning effort. The conference would provide a means to exchange information during workshops and lectures. A future oriented approach would enable participants to choose specific resource sectors and assist in the creation of several likely future scenarios. Workshops would be held concerning aids and obstacles to international cooperation as well as negotiation and bargaining techniques. The conferences would also serve to explore possible experiments in information exchange, mediation, educational exchanges and speaker forums. Initiation of the regional conferences and the memorandum of understanding could be accomplished by either federal, subnational or local authorities.

As the world's major wilderness regions become more developed, the need for international cooperation will increase. In the ABCY region, a rare opportunity exists to proactively plan for likely conflicts before they occur. Establishing a framework for cooperation will save time when serious problems arise and ideally will prevent some conflicts from occurring. Managers, planners and politicians will be more likely to deal rationally with people they have worked with than with new personalities in a crisis situation. U.S. and Canadian relations are relatively good. If amicable relations are to continue, more effort will be needed to strengthen the relationship. There is a potential to create a working model in the ABCY Region which may then be applied to other wilderness regions throughout the world.

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INTEGRATING PROTECTION AND USE IN WILDERNESS AREA MANAGEMENT AN ASSESSMENT OF THE BALI TRAINING MATRIX*

R. GRAHAM R. J. PAYNE

ABSTRACT

Approaches to wilderness management, whether in national parks or other protected areas, have focused heavily on protecting the unique natural qualities of the areas themselves while at best regulating visitor use. In the face of growing numbers of domestic and international tourists and the changing nature of recreation and tourism activity, such benign neglect of visitor management is not only difficult to justify but is itself a generator of management issues.

This paper critically examines the "Bali Matrix", the I.U.C.N.—suggested structure which outlines management abilities and skills which wilderness managers should possess. The critical examination is achieved by comparison with an example of a well-integrated wilderness management framework, the management planning system for Canadian national parks.

The examination reveals the strength of both frameworks in relation to biophysical resources and environmental management. However, two serious deficiencies in the Bali Matrix in relation to the management planning framework for Canadian national parks are noted. The failure to separate management and technical functions in the Bali Matrix hinders its utility for wilderness managers. Secondly, the Bali Matrix does not deal with understanding and managing visitors in any systematic way which could be integrated with its strength in environmental management.

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INTRODUCTION

The American Heritage Dictionary (1982) defines environment as "the total of circumstances surrounding an organism or group of organisms, especially the combination of external or extrinsic physical conditions that affect or influence the growth and development of organisms, and the complex social and cultural conditions affecting the nature of an individual or community." One might assume that the importance and significance of the environment—the sum of circumstances and influences affecting wilderness management institutions and agencies—would be self evident. We believe it is not. Although society has changed very rapidly in the last decade and the pace of change shows no sign of slowing, many wilderness managers, planners, and on-site personnel cling to the myth that it is possible to protect unique natural, historic and/or cultural qualities of an area by 'managing the resource' and 'regulating the visitor'. Customary users, indigenous peoples, tourists, vicarious publics, scientists, and on-site staff who have resided for more than a few years in an adjacent community, are sometimes referred to as 'visitors' who create 'problems' that are complex, ambiguous and unpredictable. In organizational terms, visitors to wilderness areas create questions about planning, management and agency behaviour that cannot be easily answered. Events that often seem incomprehensible are perhaps merely beyond the control of the agency (Bolan and Deal, 1984). In any case, such problems attributable to 'visitors' do not fit particularly well in either agency procedures or prevailing agency myths.

We are not using the term myth pejoratively, in the sense that something is not true. Peters and Waterman (1982) and Deal and Kennedy (1982) both identify myths as being important to organizations, particularly in their ability to rationalize difficult problems and to reconcile contradictory directions in mission statements. But myths have two sides. Although they help us cope with uncertainty, they distort our image of the environment, may misdirect allocation of limited budgets and may prevent agency employees from asking - 'why not the other way round'? (Westerlund and Sjostrand, 1979). It is time to reform the myth.

Wilderness management today must respond to demands for use of resources which continue to grow, especially in the emerging nations where many factors have limited the implementation of wilderness programs. In response to these increasing demands and complexities new methods of planning and managing wilderness areas (Brown, Driver and McConnell, 1978; Stankey et al., 1985; Stokes, 1986; Graefe, Kuss and Vaske, 1987; and Environment Canada, Parks, 1985 and 1987), impact assessment (Schreyer et al., 1985 and Freudenburg, 1986), and communications strategies (Shannon, 1987) have been developed.

The new myth proposed in this paper embraces developing an understanding of natural, cultural and historic resources, but is expanded to include an acknowledgement and understanding of the role of the visitor in agency planning and management.

The suggestion that we focus more attention on understanding and changing prevailing myths within wilderness agencies may sound too limited. Hart's monograph entitled *A Systems Approach to Park Planning* (1966), *The Commission on National Parks and Protected Areas* (1968-87), the *Bali Action Plan: A Framework for the Future of Protected Areas* (Miller, 1984), *The Man and the Biosphere (MAB) Program* (Francis, 1985 and Lief, 1985), the IUCN model of a range of protected landscapes and waterscapes (McNeely and Miller, 1984), the current thrust of IUCN to develop biogeographic representation of protected areas to increase opportunities for

genetic diversity (Conservation of Development Centre, 1984), as well as the writings of Marshall (1933), Brinsner (1960), Nash (1973), Clark (1986) and Nelson (1986), all support wilderness and protected areas as mechanisms to develop a better scientific understanding of ecological processes, increased protection for landscapes and sustainable use of these areas.

The image that we have of wilderness management is one in which both ecological and socio-economic knowledge are necessary competencies.

This image stems from the reality that management problems in wilderness and other protected areas involve interactions between people and the natural environment and among groups of people. Effective wilderness management, then, requires managers to understand these interactions and, where necessary, to manipulate them to avoid negative consequences. Such management we term "integrative" because it seeks to incorporate both ecological and socio-economic factors into problem-solving and decision-making (Payne and Graham, 1984).

The effectiveness of an integrated planning and management framework is highly dependent on the capability of the wilderness management agency to implement it. Three interrelated elements exert tremendous impacts on implementation policy/mission management structure and personnel.

Agency policy or mission must be such as to support the dual ecological/socio-economic thrusts of integrated management. Excluding one side of this duality emasculates the integrated approach to wilderness management.

Management structure describes not only the divisions of responsibility in an agency but also the extent to which hierarchy is developed and "standard operating procedures" are set in place. In management situations in which problems recur regularly, standardized procedures may be appropriate. In wilderness and protected area management, it is doubtful that standard procedures can deal effectively with changing ecological and socio-economic

situations. Management structure, therefore, should be flexible as well as capable of integrated planning and management.

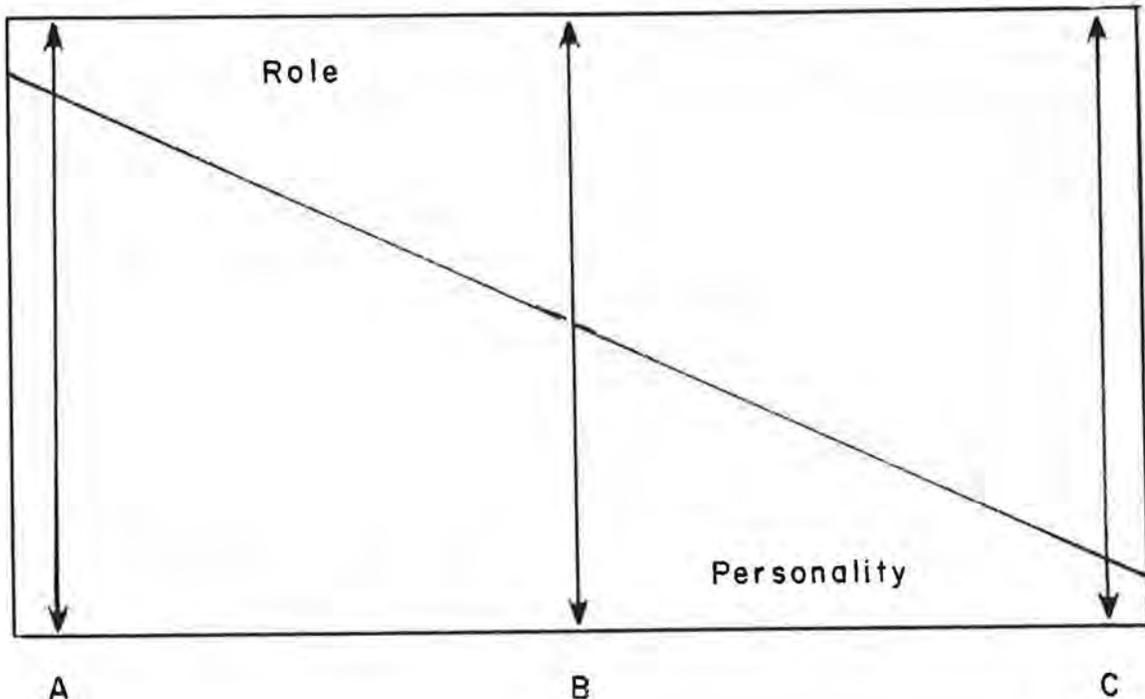
Personnel is concerned with the people, who ultimately power the agency. For wilderness management personnel must have the training to understand integrated management planning and must have the flexibility to respond to changing conditions. Figure 1 gives a graphic illustration of the interplay of tensions in any organization. At the right, role and functioning as determined by the organization dominates. Bureaucratic organizations which produce guidelines on the way to do something with minimal opportunity to express alternatives or room for individual discretion are described well by line C. On the left (line A), individual discretion dominates. Artists, writers, dancers and other creative and often unconventional individuals may be typified by this life. In wilderness management agencies, there seems to be the need for both

polar opposites. Therefore, line B might best describe the ideal situation in a wilderness management agency: personnel are encouraged to try new ideas and solutions but the basic thrusts of policy are maintained.

Employing four elements, integration, policy, management structure and personnel, as analytical tools, we turn now to our critical assessment of two frameworks for wilderness area management, the Bali training matrix and the Canadian national parks management planning process.

THE BALI TRAINING MATRIX REVISITED

The Bali Training Matrix is a description of the functional requirements for wilderness area management as determined by academics and senior agency managers at the 1982 World National Parks in Bali, Indonesia (Priddle and Botting, 1984). It embodies the functions which



should be addressed in the training of national parks and other protected area staff. In taking this approach, the 'Bali Matrix' aims to consider training needs and agency functions in a general sense. Priddle and Botting maintain that the specifics of training will be contingent upon the needs, structure and functions of a specific protected area (1984: 78).

The functions encompassed by the Bali Matrix are as follows:

- i. decision making
- ii. protection
- iii. resource management
- iv. interpretation/education
- v. administration
- vi. maintenance
- vii. planning

In addition, Priddle and Botting identify another group of functions, which they term "key associated functions" because they form "...the pillars of the protected area program" (1984: 80). These functions comprise sociology, natural science, law and resource policy, land tenure and acquisition and public relations.

These functions are generally self-explanatory. It is, however, useful to examine several in detail since our thrust in this paper is to offer a critical appraisal of the Bali Matrix in light of another functional system for wilderness area management, namely, the Canadian National Parks management planning process.

The protection function includes responsibilities toward resources and people within the protected area. This mixture of resources and people under the auspices of protection is rather curious, prompting the question of whether people are being protected from the environment or whether the environment of the protected area is being protected from people.

The elements included under the general heading of key associated functions are another curious blend. Sociology and natural science are clearly important but, just as clearly, do not belong with elements such as resource policy, land acquisition and public relations, all of

which are managerial rather than technical in nature. Moreover, neither sociology nor natural science are "functions" in the sense that decision making is. Rather, sociology and natural science are specific knowledge areas in which protected area managers should have some grounding.

If one considers the functions outlined in the Bali Matrix at a more general level, it is possible to group them into three categories. One category, management functions, would be composed of decision making, planning, administration, maintenance, legislation and policy and public relations. Another broad category, environmental or setting functions, would include protection, resource management and natural science research. The final category, people or user functions, would comprise sociology (or better, applied social science research), interpretation and education. This three-fold categorization affords the functions outlined in the Bali Matrix much more coherence and clarity. As foci for training, the categories allow for some degree of specialization while, at the same time, fostering the realization of the inter-connections among problems encountered in protected area management.

In terms of integration, the Bali matrix, through the inclusion of sociology, offers the bare minimum necessary to consider the socio-economic dimensions of wilderness management. However, other social sciences such as psychology, human geography, recreation studies and, especially, anthropology may provide more incisive insights into human use of wilderness areas.

The Bali matrix fares poorly in terms of its connections with policy. In fact, there are no overt linkages to policy of any sort, although it is possible to infer a policy perspective on the basis of the functions mentioned above. That policy perspective is essentially the prevailing myth that wilderness managers ought to be concerned with protecting wilderness and (merely) regulating people.

Similarly, management structure is implicit in the Bali matrix rather than explicit. The

structure behind the functions needs to be explicitly stated if personnel are to understand the reasons behind the inclusion of certain functions. Moreover, making structure explicit as we have above provides the opportunity for specialization, in environmental protection, in visitor/user management or in planning and management, which must be expected, given that wilderness management encompasses so many functions. As it stands, the array of functions specified in the Bali matrix represents little more than an unorganized list.

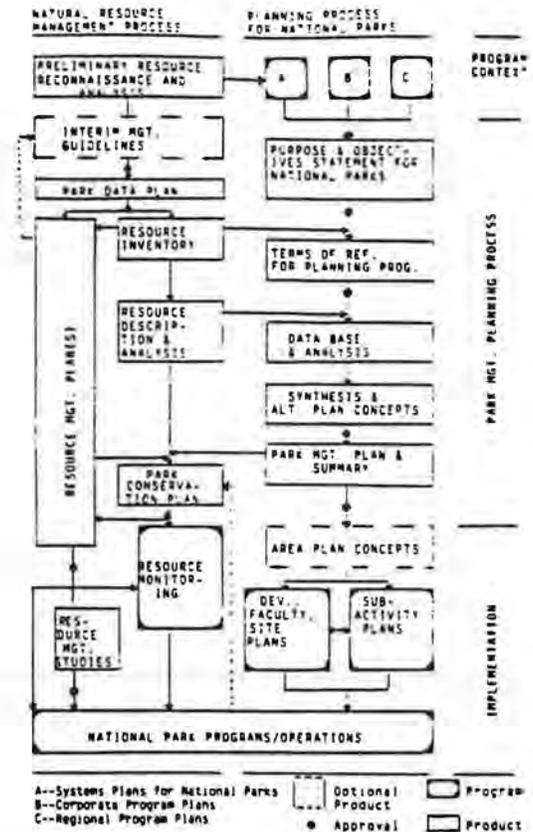
As a framework for training personnel the Bali matrix goes some way to identifying the wide range of knowledge required by wilderness area managers. However, it does not do justice to the requirement to manage use. More importantly, it ignores the critical relationships among policy, structure and personnel which substantially affect the success of wilderness management. Managers may be trained under this framework but may not understand the diversity of interactions between the ecological and social realms and may fail to respond adequately to protection-use conflicts.

INTEGRATING THE VISITOR

The Canadian Case

Canadian national parks share with national parks elsewhere in the world, wilderness areas and other forms of protected area designation, two often conflicting purposes, that of protecting significant natural and cultural landscapes and of promoting the understanding and appreciation of such landscapes and waterscapes. This conflict between preservation and use is one of the realities which protected area agencies and managers must face. It is fair to say, however, that the most common response to this conflict is a regulatory one: keep people out of this area, use signs to inform people that it is illegal (and dangerous) to feed wildlife, and in the extreme, ban people (all people) from the protected area.

Between the mid 1960s and the late 1970s, Parks Canada's management of wilderness conformed to this 'biocentric' focus. Balancing the tension between its two conflicting goals



was to be resolved by 'Provisional Master Plans' (Figure 2). With rare exceptions, the authors

of these plans received their exposure to resource management in biology, ecology, or another natural science. Typically, the plans and the planning process that were developed concentrated on abiotic, biotic and historic aspects of the existing or potential site. Any consideration about people or visitors was an after-thought to be developed after the plan was completed (Payne and Graham, 1984). The message transmitted by the planning process was natural science first. This 'biocentric bias' in staffing, training, planning and services, resulted in the development of 'fashionable lists' or 'collections of subject areas' needing further study. Issues related to the mix of opportunities, activities, services and facilities were never consistently reviewed. The plans were technically correct, according to prevailing agency myth, but failed to integrate social and economic factors.

People, the source of many, if not most management problems, were regulated; the real work of Parks was to protect the natural landscapes, watersheds and marine resources which had been placed under national park designation. However, visitation to national parks, even remote northern national parks, continued to increase. Without a problem solving process to assess actions against policy objectives and resolve the preservation and use conflict Parks' visitor management actions suffered.

When the watchword of most government agencies in Canada became restraint, benefit cost analysis and policy expenditure management systems (Canada, 1976a and b) suddenly required managers to document and rationalize annual budget estimates and relationships of the Department's budget to individual unit's multi-year operational plan.

Questions about the significance of visitors to the agency, emerging roles for indigenous people, traditional use, customary users, the public's perceptions of Parks and program evaluation could not be answered by resource information only. There was no framework within Parks where the existing meaning and use of a heritage site could be considered along with wilderness values.

It should also be pointed out that Environment Canada, Parks has neither a science policy nor a commitment by senior management to basic research (Meis, 1986) and that any research program developed by the agency must be tied to an established managerial information system or decision framework. This is not to say that the research developed by Parks to support planning was inadequate, rather that without a framework for socio-economic research, its focus and use was extremely limited.

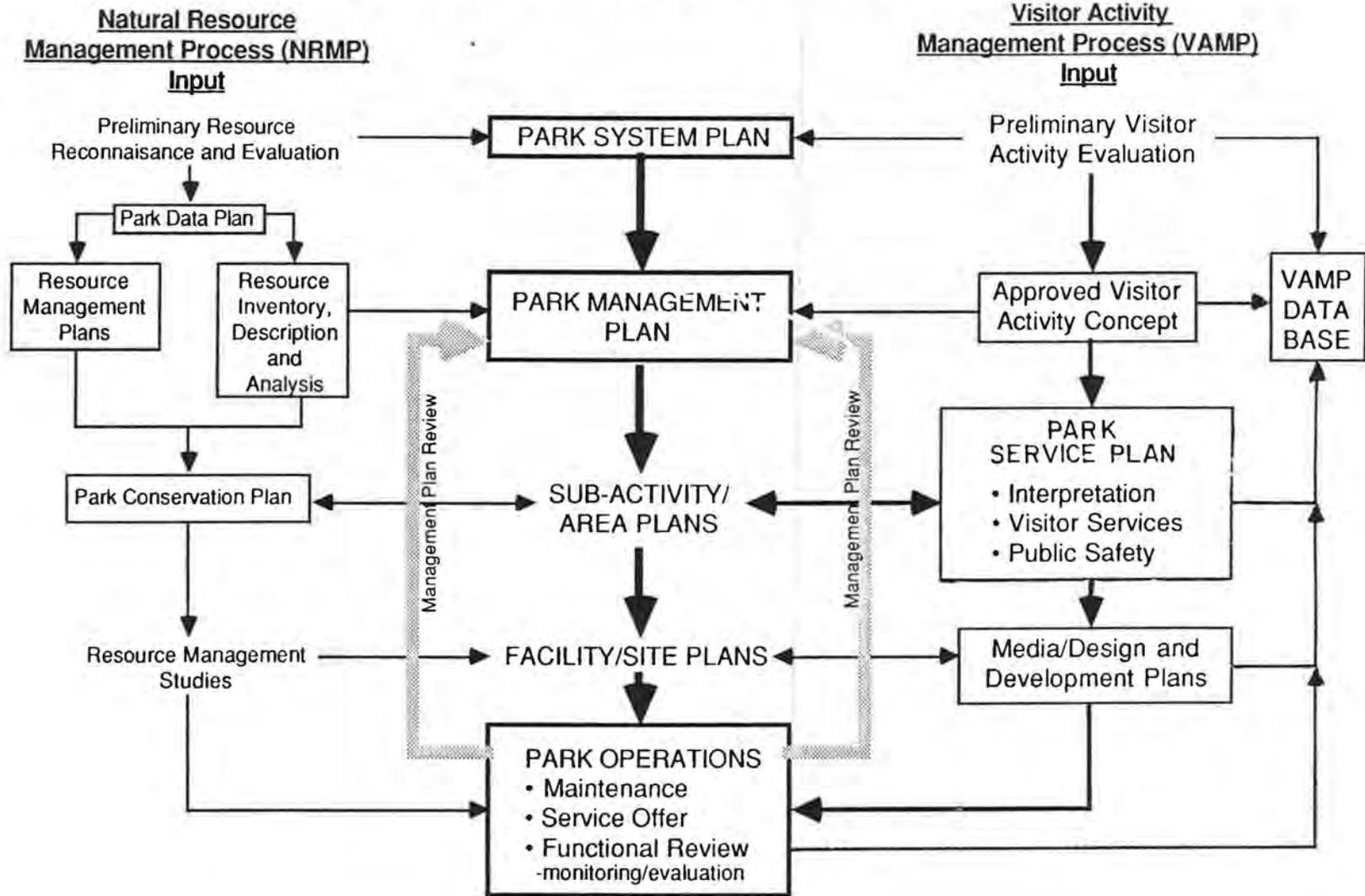
The developing realization that, like it or not, Parks was in the tourism business as well as numerous other factors, culminated in the development of a Management Process for Visitor Activities (VAMP) (Parks Canada, 1985 and Graham, Nilsen and Payne, 1987) which

recognizes the importance of integrating social science and resource management for assessing any action in protected areas. This new management process portrayed on the right of Figure 3 focuses on 'visitors' to national parks, the social and economic impacts associated with their visitation and the required policy, services, programs and facilities to support them in the parks. The approach embraces a marketing philosophy and, as such, represents a trend among several protected area agencies in North America to manage, rather than merely regulate visitors (Stankey and McCool, 1985, Payne, Graham and Nilsen, 1986, USDA, Forest Service, 1987). Park visitor interests and satisfaction are considered in parallel with the need to develop an understanding of the resource (Natural Resources Management Process). These two management processes support a management planning process which will translate policy into management action.

Ideally, a management plan, when developed with both VAMP and Natural Resource Management Process data, will:

- identify the primary heritage themes and visitor use opportunities at the initiation of a park selection process or review of a management plan,
- suggest the content and communication strategies for heritage presentation (what heritage presentation will take place),
- select appropriate visitor activities and trends,
- identify what markets need to be serviced by the park,
- potentially locate settings where heritage presentation and visitor activities will occur and under what conditions.
- monitor future trends and potential markets,
- state objectives for visitor activities and provision of services,
- examine natural resource limitations and basic visitor safety requirements,

NATIONAL PARK MANAGEMENT PLANNING PROCESS



-prioritize changes in levels of service and locations of visitor use areas, programs and facilities,

-develop a strategy for implementing changes to visitor activities offered and the market they serve,

-implement a strategy to decide what needs to be studied and how,

-identify review and evaluation requirements.

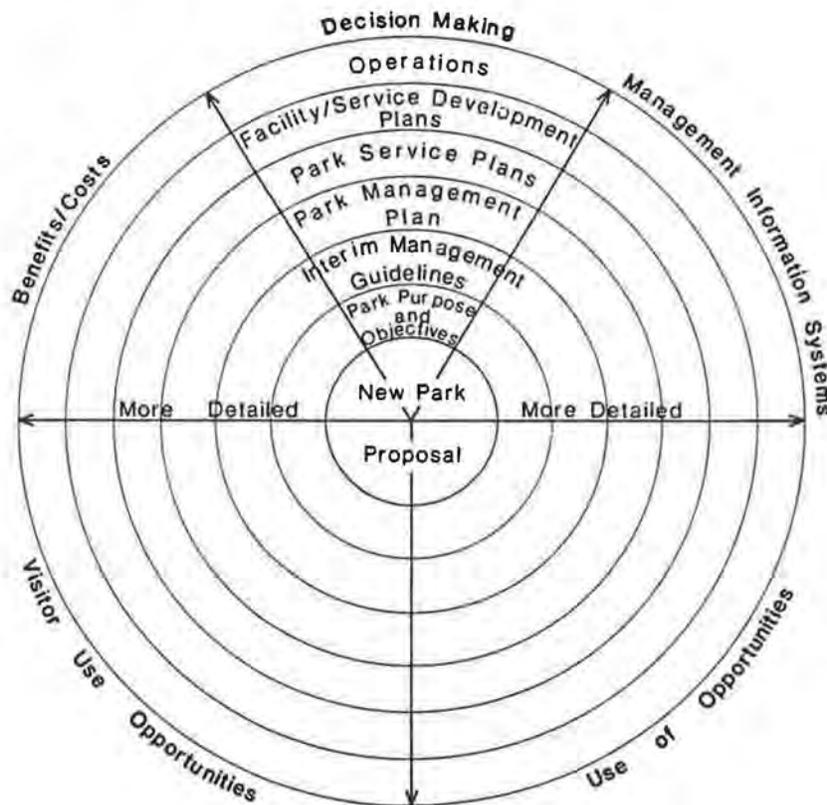
(Environment Canada, Parks, 1987)

In practice, few management plans have had the benefit of comprehensive VAMP input to date. It is acknowledged that gaps in data bases related to understanding visitors exist, and will persist for some time. As Parks moves through the next decade, the importance of integrating social science with resource

management will increase and even the most conservative individuals will recognize the imperative for this integration. The current process of change within the agency was developed not as a result of a single event or decision, but rather as a result of numerous factors and forces (Nilsen, 1986; and Graham, Nilsen and Payne, 1987).

Implementing Integration

Within Parks, a potential nomination or proposal for a site as a protected area progresses through several distinct stages of development from initial selection to operations (Figure 4). During each stage of the process, social science information is an equal partner in establishing the park or developing a management plan. We have identified five specific areas which we term 'knowledge packages'. These, we feel, are required to integrate social science into the management planning process. They have been labelled Visitor Use Opportunities, Use of



sort of integration of which policy and management structure are capable.

CONCLUSION

That conflicting expectations are held for wilderness management agencies hardly needs documentation. Reforming the myth implicit in the Bali Matrix that managing the resource will guarantee that wilderness areas will continue to exist is not an easy task. However, the adoption of a new myth will gradually focus attention on the development of a new type of wilderness manager. What we have suggested is a model which integrates protection and use in wilderness area management. If we can begin to implement this model, it will assist us in managing the interaction of socio-economic and ecological realms in wilderness areas.

The Bali Matrix undoubtedly recognizes the potential strength in understanding the resource, but it does not separate management and technical functions and marginalizes the management of visitors. Complexity in understanding the resource, interconnectedness and the element of surprise have accelerated the need to integrate social science perspectives into resource management. Through the development of the Management Process for Visitor Activities, Environment Canada, Parks has the potential to realize more effective management by integrating natural science and social science in a management planning process for National Parks.

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APPENDIX

DEFINITIONS OF VAMP'S SUPPORTING KNOWLEDGE AREAS

Core Knowledge Areas: Visitor Use Opportunities and Use of Opportunities

Outdoor Recreation: focuses on recreation as a human experience, expressed through freely chosen activities in a range of outdoor settings.

Outdoor recreation encompasses a framework which includes the study of natural, social and managerial settings which develop opportunities to realize individual and societal benefits.

Recreation Geography: Emphasizes the development of an understanding of recreation and leisure patterns of landscapes and the pressures creating these patterns.

Recreation and Leisure Studies: represents an understanding of economics, geography, psychology, recreation/leisure management and sociology traditions focused on the human experience of recreation and leisure pursuits in an individual's or group's free time.

Tourism: strives to explain and develop an understanding of spatial patterns of demand and supply; movements and flows of tourists and business travellers; impacts of tourism; geography of resorts; models of tourism space; marketing; and the hospitality industry.

Interpretation: represents an understanding of communication science as applied to revealing meanings and relationships of our cultural and natural heritage to publics, through first hand involvement with an object, artifact, landscape or site to foster relevant nonformal and informal learning.

Environmental Education: focuses on the development of environmental knowledge, skills, and the encouragement of caring beliefs, attitudes and values to the environment. It is a life-long interdisciplinary approach to the development of a population with an environmental ethic; a general understanding and sensitivity to the role of natural and cultural heritage resources and a commitment to work towards the solution of current and evolving environmental problems.

Additional Core Knowledge Areas: Visitor Use Opportunities

Resource Management: focuses on the planning, allocation, reconciliation and management of areas dedicated to protection/preservation, sustainable use and development of natural resources to meet socially acceptable goals.

History: focuses on the study of the past, especially with respect to human activity as revealed through written documents. There are two major approaches to history: 'Period History' which focuses on a specified span of years (e.g., 'The Laurier Years in Canada') and 'Thematic History', which focuses on the evolution of ideas or social institutions such as a 'History of National Parks in Canada'.

Archaeology: concentrates and develops an understanding of excavation, preservation, presentation and appreciation of antiquities. Archaeology uses artifacts more than history--which relies more on documents.

Additional Core Knowledge Areas: Use of Opportunities

Statistics: is a branch of applied mathematics. As a knowledge area it enables an individual to collect, organize, develop and interpret numerical data. It includes design and analysis of experiments (in a mathematical sense); reasoning (from general to specific); measurement issues and signature tests.

Marketing: focuses on managing an organization's exchange relations with its various publics/markets. It includes an understanding of product, promotion, price and placement. Two types of marketing are included in this definition: goods and services in both profit and not for profit contexts.

Sociology: focuses on human behaviour in groups. It includes the macro-sociological traditions of structuralism; structural functionalism; conflict theory; ethnomethodology; exchange theory; symbolic interaction and organizational theory.

Social Psychology: focuses on understanding the antecedents and consequences of behaviours of individuals as influenced by others and social situations.

Core Knowledge Areas: Benefits/Costs

Resource Economics: concentrates on understanding how cognition of resources is

reflected in allocation of the world's resources as represented by national economic systems. Applications of micro-economics to natural resource management are central to this knowledge area.

Regional Economics: is concerned with maximizing economic efficiency and attaining an equitable distribution of income and growth within a geographic area in a country. The emphasis is on geographic allocation of resources in contrast to traditional micro or macro economic theories that ignore regional differences in production or consumption of resources.

Welfare Economics: is concerned with investigating the conditions under which social welfare (quality of social life) can be maximized subject to the economic constraints of scarce resources.

Statistics (see above).

Core Knowledge Areas: Management Information Systems

Systems Design: represents an understanding of systems (a series of related procedures designed to perform a specific task) and that phase of a system's project in which the new system is designed.

Software Systems: as a knowledge area concentrates on understanding of and ability to write programs to aid in the operation of a computer system.

Computer Graphics: represents the understanding of how to make CRT terminals display not only letters of the alphabet and numbers but also graphs and drawings.

Data Base Management: concerns itself with how a series of programs can be used to establish a data base, update the data base and query the data base. (Data base is defined as a collection of interrelated data stored together with a minimum of redundancy to serve multiple applications.)

Core Knowledge Areas: Decision Making

Public Administration: embraces both the concern for administrative and organizational effectiveness and an understanding of its inherent political responsiveness.

Public Policy: focuses on an understanding of how government's past practices are linked with current perceptions and preferences in a purposeful effort to shape the future.

Law: concentrates on an understanding of inter-person, inter-corporate and inter-person, government and corporate relationships.

Decision Theory: encompasses an understanding of individuals' and groups' exchange and conflict in a choice situation.

Additional Supportive Knowledge Areas Identified

Communication Science: focuses on the study of the form, content, delivery and outcomes of communication processes.

Site Planning: represents an understanding of a landscape's natural and man-made potentials that might provide appropriate opportunities, activities, services and facilities at a park or protected area/site.

Ergonomics: is concerned with fitting the task to the person in a diversity of environmental settings (e.g., why slope and walking patterns on trails change as visitor groups change with age; visual recognition of lettering; types of equipment for rescue and treatment for exposure; anthropometrics (the spatial mensuration of movement; and prosemics [the social consequences of human deployment in space]).

Facility Planning: encompasses strategic, tactical and operational planning related to the physical environment in which recreation/leisure will occur, be evaluated and renovated.

Museology: focuses on the function, role, purpose and philosophy of the museum in society.

Architecture: suggests both an understanding of the art and science of designing and building habitable structures, which involve both aesthetic and practical principles, and the interaction between man and our physical and social environment.

Social Geography: is also equivalent to cultural geography with focus on understanding social structure and functioning of groups operating on landscapes and waterscapes.

Computer Science: combines computer architecture, graphics, network, software development, data structures, logic programming, multiprocessor systems and programming languages.

Engineering: refers to design and synthesis in relation to systems of all kinds, including management systems and organizations, technological infrastructures, machines and structures.

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CITIZENS THE KEY TO WORLDWIDE CONSERVATION

CITIZEN GROUPS: A REQUISITE TO WORLDWIDE CONSERVATION

Marry Sorensen, Sierra Club

Glenn E. Haas, Wilderness Research Foundation and Colorado State University

CITIZEN POWER! PARTNERSHIPS BETWEEN NON-GOVERNMENT ORGANIZATIONS AND OFFICIAL CONSERVATION PROGRAMMES IN SOUTHERN AFRICA

W.R. Bainbridge, Natal Parks Board

CITIZEN POWER! HOW A CITIZENS' GROUP WORKED WITH THE U.S. FOREST SERVICE TO IMPROVE THE MANAGEMENT OF THE INDIAN PEAK WILDERNESS AREA

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HOW IMPORTANT IS WILDERNESS? ATTITUDES OF MIGRANTS AND RESIDENTS IN WILDERNESS COUNTRIES

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EDUCATION OF NATURAL RESOURCE MANAGERS

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Walter Lusigi, UNESCO

CONFLICT RESOLUTION IN WILDERNESS DESIGNATION: CASE STUDIES FROM THE BUREAU OF LAND MANAGEMENT IN COLORADO

Eric Finstick, Bureau of Land Management, Colorado State Office

CITIZEN GROUPS: A REQUISITE TO WORLDWIDE CONSERVATION*

MARTY SORENSEN GLENN HAAS

Conservation of wilderness resources has depended on and continues to depend on active participation by individual citizens acting singularly or in groups. The history of conservation in the United States reveals the importance of the citizen. The singular voices of Henry Thoreau, George Bird Grinnell, John Burroughs, and John Muir in the mid-to-late nineteenth century began to elevate the nation's consciousness of a dwindling wilderness heritage. The peopling of a continent was quickly destroying a treasure house of natural resources.

As more of the public became aware of the alarming rates at which resource destruction was occurring, individuals formed associations, clubs, leagues, and societies to generate more influence. Organizations such as the Sierra Club, National Audubon Society, The Wilderness Society, and National Wildlife Federation were formed through the collective efforts of individuals whose goals were similar. The newly formed-groups then began to amass visibility and influence within the community and political arenas. As influence increased so did staying power, and that is important to remember as will be seen later in this paper.

The National Wilderness Preservation System embodies the hard work of many thousands of wilderness advocates. Behind each preserved area there is a story of the idealism, devotion, and persistence of wilderness advocates within as well as outside the (Land Management) agencies (Scott 1984). The

Wilderness Act passed the United States Congress and was signed into law on September 3, 1964, by the late President Lyndon Johnson. An aroused public had brought common sense home (Frome 1974).

The first evolutionary stage of wilderness conservation was in full swing. The process of resource allocation would see an explosion of local activist groups arise. Some of these groups would be lower echelon units of larger organizations, such as the Rocky Mountain Chapter of the Sierra Club. Others would be largely singularly focused, such as Save-The-Redwood League in California and the Alpine Lakes Protection Society in Washington. Each of these organizations have been active for several years testifying to the staying power so necessary in wilderness conservation. The Rocky Mountain Chapter has been a leader in the acquisition of lands for inclusion into the National Wilderness Preservation System (NWPS). Through a network of groups in Colorado and a membership of nearly 7,000, the chapter is able to apply pressure to politicians and community leaders to support wilderness legislation. The Alpine Lakes Protection Society and Save-The-Redwoods League formed to mobilize support for localized wilderness conservation issues (Fiddler 1976, Wayburn and Wayburn 1979). The combined length of experience for these three organizations is a remarkable 100 years.

The allocation process relies heavily on maximizing large numbers of participating citizens. It is a legislative process that requires persuasive pressure, sometimes in a relentless stream of letters, telephone calls, "alerts". It is a labor-intensive exercise, yet it sets up the foundation for developing long-term credibility associated with other issues.

*in Krumpel, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

Management planning and long-term management, in contrast to the allocation process, will be more deliberative and technical, involving land management agencies, academia and citizen participants. Since planning and long-term management involve a variety of disciplines not necessarily associated with the allocation stage, citizen groups must investigate their membership resource to isolate those who have disciplinary talents that may be useful in these two stages. Teamwork, creative thinking, and technical expertise will be essential ingredients in the formulation of short and long-term management goals, objectives, standards, and management actions.

Thus, the purpose of this paper is to identify roles which citizens or citizen groups will play in worldwide conservation and to associate these roles to the (1) allocation, (2) management planning, and (3) management stages.

ROLES

The roles of citizens and citizen groups in protecting wilderness in the United States are diverse and numerous. We have attempted to provide a categorization of these roles.

Constituency Builder

Successful preservation of the wilderness resource mandates the institutionalization of a dynamic, hardworking constituency. America's successful implementation of the 1964 Wilderness Act owes much to a concerned public. Citizen groups provide a "home" or association for people of mutual interest. A well-developed constituency sends a powerful message to the decision-makers: concern, strength, credibility, and durability.

Spokesperson

Effective citizen groups speak as one voice by appointing or electing an individual often referred to as executive director, chairperson, or president. This job is of particular importance as it focuses attention on one person, not several. The spokesperson symbolizes unity and consensus. Unity conveys strength and

credibility. A degree of flexibility must be given with this assignment. The spokesperson may, on occasion, have to react to situations which do not allow conferring with the different groups. The task is more than a courier service; it is one of leadership and responsibility.

Educator

The 1964 Wilderness Act is a superb example of the power of education. Citizen groups play a critical role in educating decision-makers and the public, ranging from identifying potential lands for wilderness protection to techniques for minimum impact camping.

One can list many individuals who spent most of their lives attempting to increase the public's knowledge of the importance of wilderness and its preservation. Aldo Leopold, Howard Zahniser, David Brower, Bob Marshall, and John Muir are but a few of the giants who labored day after day educating the masses. Several decades of effort were needed to convey the message that the allocation of wilderness resources was essential to the survival of mankind.

The management of wilderness will also require a strong educational program. Wilderness recreation use has increased dramatically during the 1960 and 1970s. The public has developed a strong attachment to wilderness. However, this attachment has not been extended to assisting the land manager in developing and implementing management plans and techniques. This is partly the result of a long-standing adversarial posture that developed between various citizen groups and land management agencies. While that posture continues to exist, there have been some positive movements towards a more cooperative arrangement between citizen groups and land managers.

In the fall of 1984, the Wilderness Committee of the Rocky Mountain Chapter of the Sierra Club appealed the decision of the Regional Forester to select and implement a land and resource management plan for the White River National Forest. The appeal challenged the wilderness management plan for those wilderness resources within the White River

National Forest in Colorado. The central thrust of the appeal was to more precisely define how the resource was to be protected. The result has been an educational process that is being molded into a cooperative arrangement that will, hopefully, see citizen groups and land managers developing and implementing management plans for the wilderness resource. Again, the common denominator is education. A challenge will be to carry the educational message of wilderness resource conservation and protection to the general public.

Power Brokering/Attention Grabber/Fundraiser

Wilderness conservation in the United States has been successful, although that success did not come easily. Building constituencies, educating the public through verbal and written communications took time and energy. Tucked away in these roles is the fine art of power brokering and capturing the public's attention. The legislative history of conserving the wilderness resources in the United States is a classic example of working the avenues of power. Gaining access to private and political power has the added advantage of accessing financial resources. These three roles are intertwined and must be cultivated carefully. Raising funds to create the interest and attention of the movers and shakers and the general public must be finessed. The reason for this is the fact that money is not as freely given in today's economy.

Team Member

Wilderness management planning and management must be a partnership between the concerned citizen groups and the land management agency. Citizen groups often have considerable technical expertise and person power which are needed to aid in such activities as developing management plans, establishing standards of acceptable change, trail reconstruction, visitor education, and water quality sampling. The allocation of lands as wilderness does not ensure agency personnel, budgets, or the protection of wilderness.

Tour Leader

Building support for areas in need of protection can be enhanced by taking concerned citizens into those areas. Both citizens and managers can learn. There is no substitute for that "up-close and personal" experience. Moreover, those decision-makers who have an impact on wilderness preservation need to see the uniqueness that exists.

Developing management plans and monitoring criteria requires complete on-site knowledge. Observing natural processes and establishing baseline data can only be accomplished by spending a great deal of time in wilderness. This can be an exciting experience. Too often managers attempt to orchestrate management plans by extrapolating historical information that may have fatal flaws. This can lead to serious long-term problems for the land manager. More problems are created than solved.

Concessionaire

Wilderness has seen an explosion of use. Scientists conduct research. Photographers find outstanding scenes to record. Hikers and backpackers recreate away from society's "hurry up and wait" syndrome. It is the recreational aspect that has given rise to numerous enterprises that offer trips into the wilderness. The result has been to increase pressure on the wilderness resource which is most sensitive to human impact. Historically, organizations involved in conducting excursions into the wilderness have shown only marginal knowledge of the impacts created by these trips. The Sierra Club, American Wilderness Alliance, and The Colorado Mountain Club conduct dozens of outings each year into the wilderness. Thousands of people have been exposed to some of the most magnificent environments possible. In some instances, the wilderness has paid a heavy price: litter, loss of water quality, loss of solitude, severe damage to vegetation. These are some of the problems we have created.

Citizen conservation groups must take a more active role in the conservation and upkeep of wilderness. This role may be

institutionalized to the extent that these groups, through some sort of contractual agreement with the land management agency, participate in the management planning and management stages. The era of railing against poor management policies must stop. A new era of participatory management must begin. This is the best means of assuring a viable and stable wilderness.

ROLES TO STAGES

The preceding section provides our views on the primary roles that citizens and citizen groups have undertaken in protecting wilderness in the United States. Yet it needs to be recognized that as the National Wilderness Preservation System has matured, there is an evolution of roles for citizens and citizens

groups. Each role must be tailored to fit a variety of conditions and circumstances. The path to wilderness conservation is not always smooth, but the rewards for success are timeless. The future of this planet is closely tied to the efforts each of us can apply to preserving those unique webs of life we call wilderness.

Figure 1 depicts our view of the relationship between the preceding roles and three stages of worldwide conservation. It is a generalized depiction which, on a case-by-case basis, may not be accurate or appropriate. Hopefully, it will stimulate an answer to the citizen groups' question: "What do we do now?"

Table 1. The relationship between citizen roles and stages of worldwide conservation.

| Roles | Allocation | Stages | |
|----------------------|------------|---------------------|------------|
| | | Management Planning | Management |
| Constituency Builder | X | X | X |
| Spokesperson | X | X | X |
| Educator | X | X | X |
| Power Brokering | X | | X |
| Attention Grabber | X | | |
| Fundraiser | X | | X |
| Team Member | | X | X |
| Tour Leader | X | X | X |
| Concessionaire | | | X |

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CITIZEN POWER; PARTNERSHIPS BETWEEN NON-GOVERNMENT ORGANIZATIONS AND OFFICIAL CONSERVATION PROGRAMMES IN SOUTHERN AFRICA*

W. R. BAINBRIDGE

INTRODUCTION

At the present time, I am an official representing one of the conservation agencies in South Africa. The Natal Provincial Administration, through our own organization and the Natal Parks Board (with whom our organization is to be amalgamated) is responsible for the administration of a spectrum of protected areas in Natal, which includes both wilderness areas and provincial (or regional) reserves.

South Africa possesses an extensive system of national parks, provincial reserves, and other forms of protected areas, including a dedicated wilderness system. Some of these areas are of considerable size and are internationally famous (such as the Kruger National Park). It is not well known, however, that South Africa is the only country on the African continent with a wilderness system formally dedicated in law. Other southern African countries, especially those immediately adjoining South Africa, also possess substantial protected areas.

Much of what I have to say concerns nature and environmental conservation programmes within South Africa itself, but both the Government of South Africa and nongovernment organizations (NGOs) are involved in cooperative programmes in neighboring countries.

I would draw your attention to the fairly substantial delegation at this Congress from southern Africa. The South African contingent

itself is one of the largest, after those from North America.

Southern Africa is a region with a great diversity of peoples, values, and interests in environmental and nature conservation. It would be an impossible task to adequately cover the position in each component country. I see it as my role to present a thumbnail sketch of the region, and to provide some detail of activities in these directions in South Africa itself.

PARTNERSHIPS WITH AND BETWEEN GOVERNMENTS IN THE MANAGEMENT OF WILDERNESS AND PROTECTED AREAS IN THE SUB-CONTINENT

Collaborative programmes are conducted on a regional scale. Many of these arise from within South Africa itself in the provision of aid and assistance to adjoining countries. The following are some examples:

The Government of South Africa has provided funds for research and technical assistance in a wide variety of fields, to a number of neighboring countries, some of which lie some distance from her borders. One project, with which I am associated, involves the provision of technical aid to the Government of Lesotho, for a project related to the long-term conservation of the alpine areas of the Maluti Mountains, that are an integral part of the well-known Drakensberg range of mountains. This project involves the funding of research programmes to characterize the environment and natural communities of this little-known area. Specific projects include surveys of the terrain types, the wetlands, grasslands, current agricultural uses, and the socio-economic status of the people who depend on the area. Surveys at a reconnaissance scale of the faunal populations are also being considered. This

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work will result in a comprehensive management plan for the area, to be drawn up in collaboration with officials of the relevant technical departments of the Lesotho Government. It is hoped that the work will result in the establishment of new protected areas in Lesotho, to adjoin existing protected areas in the Drakensberg in South Africa. The aim is to improve management for conservation of the unique alpine natural communities, the water resources (that will feed the substantial Lesotho Highlands Water Project, due for construction shortly) and the scenic resources of this important area.

The South African Nature Foundation is a regional branch of the World Wildlife Fund, based in South Africa, but with responsibilities throughout southern Africa. One of its principal functions is to raise funds for conservation purposes, which it then distributes to different conservation agencies for a variety of causes such as the establishment or development of protected areas, educational or awareness programmes, to sponsor research, and so on. The Foundation has raised substantial amounts of money in the past two decades. Funding has been provided to assist organizations within South Africa, as well as the governments of countries such as Swaziland, Botswana, Lesotho, Malawi and Bophuthatswana. Over 30 national parks and nature reserves have been created or developed during this period. Assistance has been given for the protection of wildlife in their natural habitats over an area of more than 300,000 ha.

PARTNERSHIPS WITHIN SOUTH AFRICA, BETWEEN NGO AND OFFICIAL ORGANIZATIONS

At National Level

The Council for the Environment: The Government of South Africa established the Council in terms of the Environmental Conservation Act (No. 122 of 1984) to advise the Minister of Environment Affairs on matters related to environmental or nature conservation. The Council is composed of prominent academics and conservationists from the private sector, together with senior representatives of the official conservation agencies. Through the

Council, NGOs and representatives of the private sector are able to make direct representations to the Minister. The Council thus facilitates contact and interaction between non-government and official organizations.

The Council for the Habitat: This is an umbrella organization of NGOs composed of 64 individual organizations and representing nearly half a million persons. It was established to liaise direct with the Council for the Environment, with the Minister of Environment Affairs or other senior members of government, on environmental or nature conservation issues. The Council has as its constituent members all non-government organizations that are directly or indirectly concerned with these issues. Any component NGO may make representations to the Council. The Council will usually investigate, consult with other organizations, and then make representations on behalf of all member organizations. The Council's primary task is to coordinate NGO effort in South Africa, and to act as a central mouthpiece to official organizations and to the Minister. The Council has tended to place emphasis on nature conservation matters.

Individual NGOs: There is a relatively long list of individual organizations involved in various facets of environmental and nature conservation interests in the country. At this Congress there are representatives of a cross section of these. Examples are:

- *Wildlife Society of Southern Africa
- *Endangered Wildlife Trust
- *Wilderness Leadership School
- *Wilderness Action Group

A short description of the activities of these four organizations will provide an indication of the spectrum of NGO activities in the country.

Such organizations have had considerable influence both within South Africa itself and farther afield. Their activities have significantly complemented the strivings of the official organizations across a wide spectrum of endeavours. The Wildlife Society, for example, has a substantial system of environmental education programmes in many parts of the country. Particular emphasis has been given to the education of young blacks, but people of all

colours and persuasions are reached. The Society has an excellent record in producing publications. It publishes African Wildlife, a high quality bimonthly magazine, which is widely read within the country but also throughout the region, and abroad. It has also produced a wide range of interpretive and technical publications, which are freely available. This organization has the highest membership of any NGO in the country. It is a dynamic organization, with considerable influence. It has been effective in focusing attention on particular problem areas, and in bringing pressure to bear on official organizations, when necessary. It has a good reputation for working in close cooperation with, and supportive of official organizations, for the furtherance of formal conservation programmes.

The Wildlife Society was one of the first organizations on both the national and the international scene to produce proposals for a national conservation strategy. These proposals were eventually employed by the Department of Environment Affairs in modelling the Environmental Conservation Act referred to above.

The Endangered Wildlife Trust has raised funds and mobilized actions to assist with the conservation of endangered species. Particular efforts include programmes to protect populations of desert elephant and black rhino; and in the production of information about threatened species, and the factors responsible for their precarious status.

The Wilderness Leadership School is well known as the organization originally responsible, through the efforts of Dr. Ian Player, for the formation of the International Wilderness Leadership Foundation, which in turn has been responsible for the organization of four World Wilderness Congresses. The School is primarily concerned with educational and awareness programmes, aimed at young people and prospective leaders, with emphasis on the values and appreciation of wilderness. It has been responsible for providing opportunities for a relatively large number of young people and executives, to experience wilderness and thereby

to appreciate the spiritual and other values obtainable from wilderness and protected areas, as well as the need for a balance between development and conservation of the environment.

The Wilderness Action Group was formed by the delegates from South Africa who attended the 3rd World Wilderness Congress in Scotland. Its principal aims are to foster the wilderness concept, the establishment and good management of wilderness systems in southern Africa, and to a lesser extent, concentrate on broader environmental issues. The Group is mainly composed of members who are senior representatives of other NGOs but who have particular interests in wilderness conservation, together with individuals with expertise in specific areas related to wilderness conservation (e.g., environmental law). The Group is relatively young, but it has been active both within South Africa and further afield, in such issues as obtaining international recognition for wilderness as a conservation category. It has made submissions to the Council for the Environment of this and other matters relating to wilderness conservation and management.

Individual NGOs may make representations either directly to the Council for the Environment, or through the Council for the Habitat. The Wildlife Society for example, recently obtained a two-hour interview with the Minister of Environment Affairs. The Council for the Habitat similarly requests and obtains such interviews, to discuss environmental issues.

At Provincial Level

Representatives of the Council for the Habitat, and individual NGOs have direct contact with provincial politicians and official conservation agencies. In Natal, for example, the Natal Parks Board has established a system of liaison committees, which advise the Board on policy and other matters related to specific interest areas. The Board appoints persons to serve on these committees, either in their personal capacities, or as representatives of individual NGOs.

Individual organizations may be involved in three supporting stages of programmes to aid official organizations (see Table 1).

The Mountain Club of South Africa has a number of Branches distributed throughout the country. Many of these provide search and rescue services in mountainous areas. The Natal Branch provides such a service in the Drakensberg Mountains of Natal and the Orange Free State for persons in difficulties or who are reported lost in the mountains. This service, which has operated over many years, is a collaborative effort between official organizations and private volunteers. The Natal Branch of the Mountain Club, for example, works with officials of conservation organizations, the Police, and the Air Force in mounting rescue operations. Such rescues have been known to last several days and represent effective collaborative effort between officials and volunteers, including persons proficient in mountaineering, rock climbing, and in rendering medical aid under difficult field conditions. Their teams include volunteer medical practitioners who are also mountaineers. Many successful rescue operations in which lives have been saved have been mounted over the years in the Natal Drakensberg.

The Department of Environment Affairs has been responsible for the publication of a series of recreation maps of the Natal Drakensberg. A team of volunteers, some representatives of NGOs such as the Natal branches of the Wildlife Society and the Mountain Club, have cooperated to carry out field work and surveys to provide expert inputs into the mapping exercise with representatives of the Department responsible for production of the map.

NGOs ARE STRONG IN SOUTH AFRICA

The collective NGO force has wielded considerable influence in South Africa, working at the various levels described, to effect some major changes in policy and emphasis, and to further the causes of nature and environmental conservation. While it is difficult to single out individual major achievements, the following three examples serve to illustrate the spectrum of efforts.

Possibly the most important achievements have been in the fields of environmental education and awareness. Significant contributions have also been made in applying pressure on official organizations regarding important conservation issues. Organizations

Table 1. The relationship between citizen roles and stages of worldwide conservation.

| Roles | Allocation | Stages | |
|----------------------|------------|---------------------|------------|
| | | Management Planning | Management |
| Constituency Builder | X | X | X |
| Spokesperson | X | X | X |
| Educator | X | X | X |
| Power Brokering | X | X | X |
| Attention Grabber | X | | X |
| Fundraiser | X | | X |
| Team Member | | X | X |
| Tour Leader | X | X | X |
| Concessionaire | | | X |

such as the Wildlife Society have played a major role in preventing mining in the Kruger National Park, where significant coal reserves were discovered. Similarly, pristine coastal dune forests near Maphelane on the Zululand coastline were saved from open-case mining operations involved with the extraction of ilmenite from the dune systems. Incidentally, the coastal dunes themselves are some of the highest vegetated dunes in the world. In the Cape, public pressure, which involved cooperation between a number of NGOs and private individuals, prevented a dedicated wilderness area from being reclaimed into a national park.

NGOs have also played a prominent role in the establishment of research institutions, dedicated to environmental and biological research (as have some individual citizens). As examples, the Niven family of the Cape was responsible for the establishment of the Percy Fitzpatrick Institute of African Ornithology. The Wildlife Society was responsible for establishing the Oceanographic Research Institute in Durban, for research in the marine environment. The Society was also responsible for the establishment of the Wildlife Management Association, one of many technical or professional bodies with interests in specific technical directions, some of whom publish technical journals.

DEFICIENCIES

While it has been possible to make some significant achievements by such collaborative exercises, prominent NGO members have cautioned that NGOs must be careful to preserve their autonomy and their ability to act with great swiftness when crises or major problems develop. Critics have pointed out that lobbying of politicians is largely conducted at low key level. Through increased efforts, NGOs could have significantly greater impact than at present. Critics also point out the lack of public participation in decision-making. Finally, major contributions could be made by providing funds for the purchase of land for conservation purposes. Very little has been achieved in this direction, with the notable exception of the efforts of the S.A. Nature Foundation. There is an urgent need for relatively large sums of

money to be provided for the acquisition of more protected areas in the region. Only about 4,5 % of Southern Africa is publicly owned. There is a relatively long list of priority areas that are conservation-worthy, and which justify acquisition both in the interests of the national and international communities.

PROSPECTS FOR INTERNATIONAL COLLABORATION

Mention has been made of the collaboration that exists on the sub-continent, but some of the delegates present at this Congress have suggested that while international cooperation between NGOs exists and is fostered by organizations such as the International Union for the Conservation of Nature, prospects for international cooperation in wilderness conservation could be considerably enhanced, especially in fostering the establishment and management of wilderness systems. Possibly existing NGOs in the USA who have specialized knowledge in this field, may be able to provide encouragement and advice to countries contemplating or in the early stages of the establishing of wilderness systems.

ACKNOWLEDGEMENTS

It has been a privilege to have been involved in the formal dedication of several new national parks and wilderness areas and to have in-depth involvement in the management of many such areas in such areas in two countries in southern Africa. Such endeavours are not the prerogative of individuals but are usually team efforts, inevitably involving both professional colleagues within official conservation agencies, as well as the concerned public. I am particularly grateful for the contributions made by many people sitting in this audience, especially Dr. Player, who has been a mentor and has provided of support in many directions.

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CITIZEN POWER! HOW A CITIZENS' GROUP WORKED WITH THE U.S. FOREST SERVICE TO IMPROVE THE MANAGEMENT OF THE INDIAN PEAK WILDERNESS AREA*

ANNE VICKERY

Today I'd like to tell you how a group of citizens, ordinary people without much money and some, but not a lot of expertise, got together to greatly improve the management of the Indian Peaks Wilderness area. And, by improving the management the trend towards erosion, vegetative loss, overuse and degradation has been reversed.

The Indian Peaks is a small Wilderness area just to the south of Rocky Mt. National Park where this Congress is being held. It has spectacular scenery - high alpine lakes and rugged peaks. It is a small area, only 77,000 acres. But, because it is very close to the urban Front Range - the cities of Denver, Boulder and Ft. Collins - it has the most visitors of any Colorado Wilderness - up to 120,000 a year. The number of people using the area resulted in severe environmental impacts. For many years, even before the area was designated as Wilderness, local citizens were very concerned about this.

Each year the Forest Service, the land manager for the Indian Peaks, would hold a spring time meeting on Wilderness. All the users - hikers, horsebackriders, outfitters, dude ranch owners and adjacent land owners - were invited. At the meeting, each use was discussed, problems were aired. The meeting would end and we would all go home. Citizens who spent a lot of time in the Indian Peaks knew the area was drastically overused, vegetation was disappearing, soil was eroding. In the high alpine environment we were afraid the area

would never recover. Each year we said this at the wilderness meeting. But, nothing would change. The Forest Service simply did not have the time, funds or personnel to look at drastic changes in management.

It is important to remember that land management agencies, because of the laws and regulations, political restrictions and budget which they must work under, often view a Wilderness differently from citizens who use and love the area. The Forest Service has to consider all the uses in the area and the desires of anyone who uses or could use the area. It has limited personnel and funds to do planning and to actually manage, patrol and monitor the area. Citizens are more likely to be guided by their emotions, their past experiences in the area and the importance of the area to their families.

We must realize that neither of these points of view are right or wrong or good or bad. They are simply different - and both points have validity. It is necessary to work with both to solve the problem at hand.

Each year after this meeting a friend from another conservation organization would call me from Denver and say, "Anne, why don't you all in Boulder do something about the Indian Peaks". Since Boulder is 35 miles closer to the Indian Peaks, I guess he felt it was our responsibility. After the third yearly meeting and the third phone call from Denver, we decided we would do something.

What spurred on this decision was the appearance of a remarkable lady, Dr. Anneforrest Ketchin. Dr. Ketchin, while working on her PhD at the University of Colorado in Boulder, had mapped areas in the

*in Krumpel, E.E., & P.D. Weingart, eds. 1992. Management of Park & Wilderness Reserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

Indian Peaks which were eroded and denuded of vegetation because of too many campers. She presented this map at the Wilderness meeting and I knew we had the physical evidence to get some much needed changes.

Dr. Ketchin and I got together and decided that what we needed was a citizens group which would hold its own meetings and set its own agenda so that we could talk in depth about the ecological problems of the Indian Peaks and recommend concrete management actions to try to reverse the damage. We hoped that the Forest Service would become an equal partner in the citizens group. We listed the specific issues we wanted to talk about and all individuals and interest groups who used the wilderness. With this in hand and with a great deal of determination, we approached the local district ranger and - much to our delight, he agreed.

The District Ranger said that the Forest Service would not necessarily follow our recommendations. We understood that, but - and here is a key factor - we felt that if the Forest Service participated in the meetings and was part of looking closely at the problems and searching for solutions - that it would go along with the final recommendations. In other words, they would own part of the process. If the Forest Service had not agreed to be part of the group, we had decided we would go ahead and meet anyway hoping the Forest Service would gradually be drawn in.

This is a point to remember - if for some reason the land management agency will not work with the concerned citizens, go ahead and hold your meetings and gradually try to bring the land manager into the discussions. The land manager or government agency will probably attend anyway - out of curiosity.

Now, as to the format of the meetings. We decided that at each meeting we would look at only one problem instead of lumping them all together. What had happened in the past was we would talk for five minutes about whether or not to allow campfires, then switch for the next ten minutes to where people should camp, then talk or argue for next half hour about whether or not a certain trail was a good access to the

Wilderness. This accomplished nothing. So we set one meeting for each subject - campfires, campsites, access, should there be a permit system, should dogs and horses be allowed and where. And we agreed that we would look at each subject in detail. This is an important point - we knew the subjects overlapped. Obviously it is difficult to separate the damage done by too many campers in one area from the damage done by continually building fires in the same area. We decided to recognize the overlap, but concentrate on only one issue until we thoroughly understood it and had come up with some management recommendations. And this worked. I would highly recommend this tactic to you when you are dealing with a complex subject. Separate the issues and understand each one thoroughly before putting them together.

We also agreed that at each meeting we would come up with scientific rationale as to why each problem existed and with specific recommendations as to how to correct the problem. We were working with people who had many different ideas on management. But we were creating a forum, as unemotional as possible, to discuss these different ideas. And we were basing this forum on scientific information regarding resource damage that we all probably could agree on.

The next step was to put together a meeting structure that would produce results. What are the ingredients of a successful meeting? First of all, we had Dr. Ketchin who knew the Indian Peaks very well from a scientific viewpoint and who had documentation to support overuse. Secondly, I was able to devote about 1/5 of my time, working for the Colorado Mountain Club, to the project. The county government and the Forest Service agreed to help in mailing notices and minutes of meetings and in finding rooms to meet in. Because we wanted our recommendations to be based on scientific research, we started looking to the university for experts on vegetation, soil and water quality.

Some of you may be thinking about an area you are particularly interested in and may say, we are not near a University, we don't have scientific experts. We don't have someone to

spend 1/5 of his or her time on this. If you look around, you are sure to have more expertise than you realize. Wild areas throughout the world will always have friends and among these friends are people who know the area well - they are your experts. You can begin by drawing your own maps by hand. They can be crude maps as long as they get your point across. We put our own map together from existing topographical maps. We marked boundaries and access points and used the map as the focal point of our discussion. Use students from biology, geography, public relations departments in local colleges, community schools and even high schools. We used some university people as our experts, but we also asked people from the County, from the Health Dept., from homeowners and user groups, from the Forest Service and from other land management agencies to talk to us. When in doubt, we held our own field trips. When people outside our original group heard what was going on, they wanted to join in. It can be done - your resources are always broader than you think.

What about money? We had no budget or funds. People brought sack lunches to meetings. The county or Forest Service mailed out notice of meeting, agenda and minutes. After all, informing the public was a responsibility of government agencies and our group through our meeting was helping them fulfill that responsibility of involving the public. It is a good idea to point out to the government agencies how you are helping them.

Once we had set meeting dates and brought the interested people to the table, the key was to make each meeting productive. We always met around a table so that everyone felt part of the group. First we had introductions, then we had brief presentations, perhaps 15 to 20 minutes, by an expert or several experts on the subject of the day. These presentations always included remarks by the Forest Service on how the agency viewed the particular issues. This enabled the citizens to know exactly where the Forest Service was coming from and it let the Forest Service know that we valued and respected its point of view.

The next step after the presentation was not, as you may think, a general discussion. Rather we allowed time for the experts and presenters to ask each other questions. Experts and technical people can clarify issues and pinpoint discrepancies, misunderstandings and inaccuracies much quicker than the average citizen. We save a lot of time that way and clarified a lot of issues. Then we opened the discussion to the citizens who were present. By then, most of the questions had been answered and we were well on our way to a recommendation for management which we could all agree on.

One subject which we discussed is relevant to management of all wilderness - that is access points. An access point is the point, the trailhead, the parking lot, the boat dock, etc. at which people can get into the particular area. This could be only a few places or the whole boundary. Understanding access is the key to management of the whole area. We realized that controlling access points was the best and perhaps the least expensive tool for decreasing or increasing use. Each access point had different problems and calls for different management. Dealing with each individual access reduced the problem of how to deal with up to 120,000 visitors a year to a manageable level. We still have problems at the Brainard Lake, Hessie and Corona Pass access areas, but we also have an understanding of how what happens at each access affects the area as a whole. If you control use in one area, you must be prepared for increase use in other areas. We called this the jello effect - if you push down on one side of a bowl of jello - it pops out somewhere else.

I believe that one reason our meetings succeeded was that we stuck to the agenda - you need to find a determined moderator whose goal is to keep things on track. The last part of the agenda for each meeting was set aside for management recommendations. We asked people not to leave until we had agreed upon some recommendations. Everyone stayed frankly because they did not want recommendations with which they did not agree.

We had approached the Forest Service in February, 1982. In May of 1982, 27 recommendations varied from "no campfires, including charcoal...to be enforced year round" to "the Forest Service, in conjunction with...public groups and landowners should look at a program of volunteer contributions for managing the Wilderness and the access area." Each recommendation was accompanied by technical rationale as to why the policy was recommended. For the no campfires recommendations we had 6 technical rationale, some of which were:

- in many areas of the Wilderness dead wood suitable for fuel is scarce or absent;
- numerous campfires on the same spot have led to soil compaction, sterilization and erosion resulting in decreased vitality of surrounding vegetation;
- with the current budget and manpower situation the no-fire policy is the most practical to enforce.

Over a period of four months we had held nine meetings in four different meeting places. We had learned that as citizens we could form our own group, create and follow our own agenda and that the management agency would participate in and respect our efforts.

What happened with our recommendations? Many were accepted into a new management plan for the Indian Peaks. Two very popular and overused drainages were closed to camping. Fires were prohibited in major sections, but not in all of the Wilderness as we had recommended. Overused campsites were closed and revegetated. A permit system was instituted. Use has been reduced and the area is beginning to heal.

We still have major problems in the Indian Peaks. Dogs which are supposed to be leashed run wild and contribute to a decrease in wildlife. On the southern border there will be increased vehicle traffic in an area where vehicles can easily drive into the Wilderness. We would like to see a no-fires policy ythroughout the Wilderness. The major access has two large

parking lots which attract many people to the fragile tundra areas. We would like to see these parking lots and the trailheads moved away from the Wilderness to a better location. We are continuing to work with the Forest Service on these issues.

In the meantime our Indian Peaks Working Group has evolved to place over 30 backcountry hosts on the popular trails to assist visitors and encourage following the regulations. We sell T-shirts and maps to raise money and sponsor scientific and cultural programs on the Wilderness area - but that is another story.

I would like to leave you with the thought that citizens have immense power to bring about desired changes. You, too, can have a real impact on how your favorite Wilderness is designated and managed. And I wish each of you luck in your own particular endeavor.

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HOW IMPORTANT IS WILDERNESS? ATTITUDES OF MIGRANTS AND RESIDENTS IN WILDERNESS COUNTIES*

GUNDARS RUDZITIS

INTRODUCTION

Counties which contain or are adjacent to a federally designated wilderness are among the fastest growing in the United States. Presently there are a total of 277 wilderness counties in 38 states. Most of these counties are not within or near any metropolitan area. Only 67 of the 277 wilderness counties are within 50 miles of a standard metropolitan statistical area, and most of these are in California.

My calculations show that from 1970 to 1980 these largely rural remote areas grew at a rate of 30 percent or double the 15 percent rate of growth for nonmetropolitan areas as a whole (Table 1, page 4). During the fifties and sixties, these counties also grew at a rate two to three times greater than nonmetropolitan areas as a whole. While post-1980 estimates indicate that nonmetropolitan areas as a whole are growing again at a slower rate than metropolitan areas, wilderness counties are gaining population at a significantly faster rate. Furthermore, these results do not vary by region, or change if states such as California are dropped from the calculations. On a percentage basis these are some of the fastest growing counties in the nation, and the reasons why they are growing are not well understood.

Wilderness areas have to be designated by Congress, and the formation of such areas has been a hotly contested and politicized issue since the passage of the 1964 Wilderness Act (Rudzitis, 1984). By definition, wilderness areas have to be left as pristine areas where the influence of people is kept to a bare minimum.

For example, roads are not allowed in these areas, and the building of trails remains a controversial issue. Unlike national parks, they are not meant to be high use recreation areas. Moreover, areas are still being and will be added to the wilderness system. In 1984, over 8 million acres of new wilderness were designated, and the debate over how much wilderness is still not over in a number of states.

Wilderness area counties hold a range of amenities constant even as other may vary. Clearly, climate will vary across different areas. But more importantly, other amenities such as access to pristine areas and lower pollution levels will vary little if at all. Congress under the Prevent Significant Deterioration regulations put wilderness areas into a mandatory Class I status which essentially results in preservation since only minimal deterioration in air quality is allowed in these areas. Other air quality related values such as visibility also are to be strictly protected (Manners and Rudzitis, 1981; Rudzitis and Schwartz, 1982). Even if there are differences by the types of amenities in wilderness counties, these areas have a high level of amenities.

In a sense, irrespective of their location, wilderness areas should have attributes which are similar in that they attract households and firms seeking certain high quality environments. Indeed, as Cutter, Renwick and Renwick (1985) suggest, once only cities were considered beautiful, but today, for millions of Americans, only wilderness is beautiful.

*in Krumpke, E.E. and P.D. Weingart, eds. 1992. Management of Park and Wilderness Preserves. Proceedings of a symposium at the 4th World Wilderness Congress, Sept. 14-18, 1987. Estes Park, CO. Wilderness Research Center, Univ. of Idaho, Moscow, ID 83843

BACKGROUND

The demographic phenomenon called the nonmetropolitan turnaround occurred in its fullest force in the United States during the 1970s. Most of the nonmetropolitan counties experienced population increases, reversing their past trends of population losses or stagnation. This population growth was primarily caused by in-migration since fertility was low and thus natural increase did not contribute much to the growth.

The turnaround has been called one of the most significant demographic events of this century (Wardwell and Brown, 1980). The movement of people to rural counties was not anticipated nor expected. However, it was seen as a pervasive new counter-urbanization trend destined to profoundly change the geographical structure of the United States (Berry, 1978). There have been a number of good overviews of the turnaround (Berry and Dahman, 1977, 1980; Morrill, 1978, 1979; Fuguitt, 1985).

The turnaround surprised many researchers because the urbanization trend, whereby people concentrated in and around large cities, had been the major dimension of population redistribution in the United States since the census was first taken in 1790 (Hauser, 1981). Most researchers concerned with population trends assumed that this urbanization process would continue into the future, as an almost inevitable concomitant of economic development and increasing organizational complexity.

During the 1960s, the net movement of people was from rural and small town areas into metropolitan areas. But since 1970, changes in rural and urban population flows were such that nonmetropolitan areas were not only retaining people, but receiving an actual net in-migration as well (Beale and Fuguitt, 1978).

There is no simple answer as to why nonmetropolitan areas are growing. People move and places increase or decrease in population because of a complex combination of factors. For example, several recent studies (Beale and Fuguitt 1978; Fisher and Mitchelson 1981; Johansen and Fuguitt 1984) cite among

the factors that have encouraged population growth in nonmetropolitan areas:

- a. presence of colleges
- b. growth of recreation and retirement activities
- c. growth of military activities
- d. the decentralization of many industries
- e. increased mobility through transportation improvements
- f. improved communications and media in rural areas

There is no general agreement on one universal cause for the turnaround in population growth in nonmetropolitan counties. Site specific factors may be predominant. Some are employment connected, while others are non-economic in nature. Traditional models of regional growth have stressed economic factors, people move to get jobs and make higher incomes. More recently however some evidence has suggested that amenity or quality of life factors have an increasingly important role to play.

Ullman (1954), in his now classic article, cited amenities as a major factor in the regional growth process. His definition of amenities included climate, scenery, hunting, fishing, sports, and retirement and tourist factors as desirable attributes that would encourage the growth of one area over another. Ullman used the migration to Southern California during and after World War II as his prime example of the importance of amenities in stimulating regional growth. According to Ullman, amenities were becoming more important than economic forces in explaining growth. Moreover, he predicted that the importance of amenities would increase and that further research in this area was required. Although his study was speculative and largely based on observation, it was farsighted at a time when the role of amenities in the regional growth process largely was ignored.

Almost twenty years later Borchert (1972) emphasized again the pull of amenities in the growth process finding that between 1960-1970 counties with high natural amenity had high relative growth rates. Since then a number of studies have documented the increasing

importance of amenities in explaining the recent migration turnaround (Lamb 1975; Long and DeAre 1980; Briggs and Rees, 1982; Ploch 1978, Williams and Sofranko 1979).

The relative importance of non-economic amenity factors in the migration of non-economic amenity factors in the migration process remains controversial. Porell (1982) finds that both economic and quality of life factors are important but suggests that migration is more responsive to marginal changes in economic factors than quality of life factors. This contrasts with the results from other studies (Graves 1979, 1980, 1983; Liu, 1975; Hsieh and Liu 1983). At the same time, Porell points out that the total impact of quality of life differentials on migration may be large. In a related vein, several recent studies suggest that the wage and income convergence that would be expected from the traditional economic, human capital model is not taking place (Greenwood 1975; Clark and Ballard, 1980; Krumm 1983; Mead 1982). Migration has not had the expected equilibrating effect on regional income differentials.

STUDY - RESULTS

As part of a study on migration into wilderness counties questionnaires were sent to recent in-migrants and longer term residents in four counties in the West (Trinity, California; Deschutes, Oregon; Coconino, Arizona; Eagle, Colorado). The mail survey was designed to reveal the motivations for migration to these counties, and whether traditional economic or noneconomic factors played a more important role in the decision to migrate to these areas. Particular attention also was directed at the importance of federally designated wilderness in the county as a factor influencing a person's decision to move to the area. The survey also examined how satisfied migrants are with their life in these counties, and their intentions to stay or leave. The attitudes of the in-migrants were compared with those of residents.

A person was considered a migrant if they moved into the county since 1975. All persons who have lived in the county prior to 1975 were classified as residents. The respondents were

randomly selected and a total of 995 people returned surveys for an overall response rate of 54 percent. The counties are part of a national survey of 15 wilderness counties across the nation. Consequently these four counties represent about 27 percent of the total expected responses. Some intriguing results already are apparent in these four counties.

All four of these wilderness counties grew very rapidly during the 1970s (Table 2). There has been a slowdown during the 1980s but the growth rates with the exception of Trinity county still exceed that of both nonmetropolitan and metropolitan counties as a whole. Who are these migrants? One reason often given for such a growth is retirement related. However, only 10 percent of the migrants to these counties were over 65 years of age compared to 26 percent of the resident population. The largest group of migrants was in the 21 to 35 year age category (Table 3). The migrants also were more likely to have been raised in a metropolitan area (40%) while the residents grew up in a rural or small town environment (53%). Younger highly educated migrants are the most important components of the inflow into these counties. Over 74 percent either had some college, or completed graduate work.

Traditional models of migration argue that people migrate for economic reasons. However, the survey results indicate that economic reasons were not the main reasons why people moved to these counties (Table 4). Noneconomic amenity reasons (outdoor recreation, landscape, pace of life, environmental quality) were more important than factors such as employment opportunity. Income was not a major factor since with the exception of Eagle county the majority of migrants either had no change in income or suffered a loss in income (Table 5).

Despite a loss of income most of the migrants felt that their lives were less stressful, more enjoyable, healthier and happier since

Table 1. Population Change.

| <u>Metropolitan Year</u> | <u>All Counties</u> | <u>Nonmetropolitan Counties</u> | <u>Wilderness Counties</u> |
|------------------------------|-------------------------|-------------------------------------|--------------------------------|
| 1950-1960 | 26.3% | 3.0% | 18.2% |
| 1960-1970 | 17.1% | 4.3% | 12.8% |
| 1970-1980 | 9.9% | 13.4% | 31.4% |
| 1980-1985 | 11.0% | 6.9% | 24.3% |

Table 2. Population Growth, 1970-1985

| <u>County</u> | <u>Percent Change 1970-1980</u> | <u>Percent Change 1980-1985</u> |
|---------------------|-------------------------------------|-------------------------------------|
| Trinity, California | 56 | 13 |
| Deschutes, Oregon | 104 | 7 |
| Coconino, Arizona | 55 | 13 |
| Eagle, Colorado | 78 | 22 |

Table 3. Age Distribution of Migrants and Residents (percent)

| <u>Age</u> | <u>Resident</u> | <u>Migrant</u> |
|--------------------|-----------------|----------------|
| Less than 20 years | 0.3 | 0.2 |
| 21-35 years | 7.9 | 35.1 |
| 36-50 years | 35.3 | 40.3 |
| 51-65 years | 29.7 | 14.1 |
| Over 65 | 26.5 | 10.3 |

Table 4. Why Moved to County (percent citing as important)

| <u>Attribute</u> | <u>Trinity</u> | <u>Deschutes</u> | <u>Coconino</u> | <u>Eagle</u> |
|----------------------------|----------------|------------------|-----------------|--------------|
| Employment Opportunity | 29 | 32 | 55 | 61 |
| Cost of living | 16 | 21 | 10 | 23 |
| School Quality | 23 | 22 | 42 | 7 |
| Climate | 58 | 78 | 71 | 62 |
| Health and Social Services | 6 | 23 | 13 | 9 |
| Access to Family & Friends | 18 | 22 | 16 | 19 |
| Outdoor Recreation | 79 | 82 | 70 | 77 |
| Crime Rate | 44 | 27 | 33 | 30 |
| Landscape/Scenery | 84 | 77 | 79 | 80 |
| Pace of Life | 78 | 74 | 62 | 77 |
| Environmental Quality | 81 | 78 | 74 | 76 |
| Place to Raise Children | * | 48 | 57 | 32 |

*question not in survey

Table 5. Income Change (percent)

| <u>Income Change</u> | <u>Trinity</u> | <u>Deschutes</u> | <u>Coconino</u> | <u>Eagle</u> |
|----------------------|----------------|------------------|-----------------|--------------|
| Decreased | 58 | 48 | 40 | 24 |
| Same | 24 | 29 | 22 | 25 |
| Increase | 18 | 23 | 38 | 51 |

Table 6. Since I Moved To...My Life Has Been (percent citing)

| <u>Statement</u> | <u>Trinity</u> | <u>Deschutes</u> | <u>Coconino</u> | <u>Eagle</u> |
|------------------|----------------|------------------|-----------------|--------------|
| Less stressful | 79 | 72 | 58 | 62 |
| More enjoyable | 92 | 91 | 90 | 90 |
| Healthier | 90 | 95 | 85 | 88 |
| Happier | 87 | 89 | 84 | 89 |
| As envisioned | * | 85 | 78 | 73 |

Table 7. Importance of Wilderness (percentage)

| <u>Statement</u> | <u>Trinity</u> | <u>Deschutes</u> | <u>Coconino</u> | <u>Eagle</u> |
|---------------------------|----------------|------------------|-----------------|--------------|
| Why moved or stay in area | 63 | 70 | 79 | 88 |
| Need more access to | 52 | 43 | 47 | 53 |
| Open for development | 17 | 7 | 6 | 9 |
| Important to county | 91 | 92 | 95 | 98 |
| Designate more nearby | 37 | 47 | 71 | 80 |

Table 8. Importance of Wilderness for Migrants and Residents (percent)

| <u>Statement</u> | <u>Resident</u> | <u>Migrant</u> |
|---------------------------|-----------------|----------------|
| Why moved or stay in area | 70.1 | 80.1 |
| Need more access to | 44.1 | 54.1 |
| Open for development | 8.5 | 3.8 |
| Important to county | 91.5 | 96.2 |
| Designate more nearby | 46.9 | 68.5 |

they moved to these counties (Table 6). The responses to these questions show that migrants while generally not having income gains feel that their lives have improved in other perhaps more important aspects. Indeed over 90 percent of the migrants were satisfied with their lives in these counties.

The presence of federally designated wilderness nearby may or may not be an important consideration in why people move to or stay in an area. The presence of wilderness was a very important reason in why people moved to or stay in these counties (Table 7) and perhaps explains the high level of satisfaction with their lives in these counties.

Moreover, the majority of the respondents used the wilderness areas more than seven times a year. On whether more access was needed to the wilderness areas the respondents were fairly evenly split.

On the question of whether wilderness should be open for development they felt strongly (83 to 94 percent) that it should not. An even larger number (91 to 98 percent) felt that nearby wilderness areas were important to their county. On whether or not more wilderness areas should be designated nearby the responses varied between the four counties. Only a minority in Trinity and Deschutes (37 and 47 percent) were in favor of more wilderness while in the more tourist oriented

Coconino and Eagle counties the percentages were 71 and 80 percent respectively.

Do differences exist between the attitudes of migrants and residents towards wilderness? While some differences exist between migrants and residents they are not that large (Table 8). The presence of federally designated wilderness was an important reason why 80 percent of the migrants moved there and why 70 percent of residents stay in the area. Migrants were more in favor of more access to wilderness areas (54% vs. 44%) and slightly less likely to open wilderness for development (4% vs. 8%). Both agreed that wilderness is very important to the county. However, the migrants were more in favor of designating more wilderness nearby.

Given the recent decline in many nonmetropolitan counties, particularly in the West, and the high mobility of the American population a question was included about future migration plans during the next three years. In Eagle 71 percent did not plan to move and in the other three counties the range was from 81 to 85 percent. Overall migrants were more likely than residents to move the next three years (25% vs. 15%). Nevertheless, compared with the national average this is a very stable population. People who move into these counties plan to stay and put down their roots in these areas.

CONCLUSIONS

The rapid population increases in these counties are primarily the result of an influx of young highly educated persons. They are not moving seeking higher incomes. Indeed the majority of migrants had a drop in income. Instead environmental, quality of life, amenity and recreational factors are most often cited as reasons why they moved to these counties. Despite having lower incomes the migrants are happier and healthier. The presence of wilderness is an important reason for moving to these areas and both migrants and residents feel strongly about protecting the wilderness areas from any development.

The results suggest that amenities and quality of life factors may become increasingly important in the decision of where to live even

if this means a drop in income. The 277 wilderness counties have a total of 32 million people or approximately 13 percent of the total United States population. The question is whether as economic circumstances allow, will more and more people move away from metropolitan areas seeking a higher quality of life? Will these areas with designated wilderness be able to maintain the very features which make them attractive if rapid population increases become too great? Are the results presented here representative of attitudes of migrants to the other wilderness counties across the country? Do regional differences exist in the importance of amenities in attracting in-migrants? What implications might these findings have on local development strategies. These are some of the questions which remain to be answered.

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THREE ESSENTIALS FOR A SUCCESSFUL VOLUNTEER PROGRAM A LAND MANAGER'S PERSPECTIVE*

RONALD L. HENDERSON

I work on the Gila National Forest in the State of New Mexico. The Forest is made up in part by three wilderness areas; Gila Wilderness (558,000 acres), Aldo Leopold Wilderness (202,000 acres) and the Blue Range Wilderness (29,000 acres). To manage these wildernesses and the other Forest recreation programs, volunteers are important and wide use is made of volunteers. The Forests' spectrum of volunteers range from the single volunteer who walks in the front door to the Boy Scouts of America who can field 300 - 500 scouts for up to one week to formal organizations such as the Student Conservation Association who recruits, screens and assigns volunteers.

Volunteers offer their time, abilities to work and talents not available in the agency; however, volunteers also have needs and desires that must be met. Volunteers do not receive monetary compensation and their paycheck, so to speak, comes in other less tangible forms. The manager must recognize these needs and desires and structure the program to meet the volunteers' needs.

From my experience as a land manager there are three essentials that must be followed if a successful volunteer program is to be achieved and one that meets the needs and desires of the volunteers. These three essentials hold true regardless of the individual or organization. These three essentials are:

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PLAN, PLAN, PLAN TRAIN, TRAIN, TRAIN REWARD, REWARD, REWARD.

Planning:

Planning: Without planning, a volunteer program soon degenerates into a menial busywork type situation with frustrations and bad feelings. Also, without proper planning, normal agency work is interrupted. Proper planning should include the entire time frame for completing the project, agreement on what the agency will provide and what the volunteer will provide, length of the volunteer period, work hours, supervision, work attire, description or understanding of work quality. It is very desirable that all agreements between the agency and volunteers be briefly documented to prevent misunderstanding. The agency annual work program should also provide time to manage the volunteer program. Without agency commitment of time, agency employees soon become volunteers donating their days off and working extra hours to accomplish the agency mission and manage the volunteer program. Employees soon burn out and develop a negative attitude toward volunteers.

Training:

Volunteers are enthusiastic, energetic, willing to work and donate their time; however they often come with little or no work skills. Often one of the needs that volunteers are desiring is hands on actual work experience. A good brief training session is needed in the proper use and handling of shovels, axes, crosscut saws and use and handling of pack and saddle stock. Time spent training volunteers will enrich the work experience and prevent injuries. It is also very desirable to provide

Opportunities, Benefit/Costs, Management Information Systems, and Decision Making. As one moves from the centre of the figure to the edge of the circle, the relative importance of a particular knowledge package changes. The derivation of these knowledge packages requires explanation.

The Visitor Use Opportunities package relates directly to supply (capability) considerations. This knowledge package affords the theoretical background necessary to comprehensively determine potential visitor activities for a site, policy respecting regional integration of the protected area and national regional role of the site, potential visitor markets and the constraints and capabilities (potential/limitations) of the resource. This package plays a critical role in the VAMP process in that it assumes the integration of visitor-related and natural resource data.

The Use of Opportunities package represents demand (suitability). By applying the theoretical background of this package, visitor use of and satisfaction with heritage-related opportunities can be assessed.

The Benefits/Cost package addresses the need to examine the feasibility of any visitor activity in terms of social, economic and political forces. Concepts generated by using a combination of knowledge areas from the Visitor Use Opportunities and Use of Opportunities package are subject to review and assessment by the background and techniques contained in the Benefits/Costs package.

The knowledge package we have termed 'Management Information Systems', includes the informational background, theory and techniques to structure, utilize and store visitor information.

Decision Making is the fifth package and is included because the social science information must be integrated into other management processes and administration. (Definitions of the 'knowledge areas' are included as an appendix to this paper.)

One of the strongest points about the management planning framework for Canadian national parks is its capability to ensure that both protection and use issues are considered and managed. The integrated management perspective we outlined at the outset of this paper is very well contained in the management planning approach now being adopted in Canadian national parks.

Another strength is found in policy. National parks policy has encompassed since 1979 a commitment to protection and to facilitating understanding, appreciation and enjoyment for visitors. Moreover, as national park reserves are established in areas of the country where native land claims are outstanding (e.g. South Moresby, Northern Ellesmere etc.), the flexibility of the policy in accommodating traditional uses is especially noticeable. National parks policy guides management planning in each national park (reserve).

The addition of the Management Process for Visitor Activities provides the national park management planning process with a structure which enables integration to occur. It can be seen (in Figure 3) that the Natural Resource Management and the Visitor Activity Management processes support management planning by providing key inputs at various stages which enable issues to be identified and managed. The strong connections of the management structure with national parks policy ensure that management planning decisions reflect that policy.

As strong as the Canadian national parks management process is, it currently has a definite weakness. That weakness is the personnel element. While policy and management structure reflect a commitment to integration, the agency has not yet been able either to re-train existing staff or to hire staff who are trained to manage visitors. It is fair to say that existing staff in national parks, even where they work with visitors in interpretation and visitor services, have training in the natural sciences. Until this state of affairs is remedied, it will continue to be difficult to implement the

basic orientation concerning agency policy and procedures. A mix of 4 hours classroom instruction and 4 hours field training prevents boredom and provides for better retention. On the Gila, we try to provide a week of training before we allow volunteers to work in the wilderness. Followup training sessions during the volunteer work period must not be forgotten.

Agency policy and procedure training can often be accomplished by including the volunteers into the organizational structure. Inviting the volunteers into planning meetings and informational briefings makes them feel a part of the organization and results in a more meaningful work experience. An infusion of new ideas into agency meetings is, or should always be, welcome.

Reward:

Everyone likes to be recognized for a job well done. This is especially true for volunteers. Often this is the only paycheck the volunteer will receive. Managers need to be innovative in rewarding volunteers. Some examples we have used on the Gila National Forest are: plaques, patches, potluck dinners, volunteer days, introducing volunteers to visiting dignitaries, newspaper or media releases. These few examples just scratch the surface; many more ways exist to reward. Rewarding probably meets more of the volunteers' needs and desires than the other two previously mentioned essentials put together.

In conclusion, I will not guarantee that if you adhere to the three essentials "PLAN", "TRAIN", and "REWARD" that you will have a successful volunteer program; I will guarantee that if you don't "PLAN", "TRAIN", and "REWARD" your volunteer program will be a failure.

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EDUCATION OF NATURAL RESOURCE MANAGERS*

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Management of large areas of wild lands in many developing countries has become so complex that most traditional education programs are not adequately preparing managers for the tasks. Many of the current university level programs focus on a single discipline, i.e. forestry, wildlife, range, fishery, watershed or park management. Unfortunately little attention has been given to a multi-disciplinary approach or integrated management. Since many third world countries cannot afford the luxury of setting aside large areas for strictly preservation purposes, a multiple-use approach of wild land to produce benefits to the people is necessary if these lands are to remain in a somewhat wild situation. It is proposed that portions of wild rural lands be considered as conservation areas which would contain parks or reserves to protect unique ecological, scenic or cultural features. The whole area would be managed as an integrated multiple-use area to produce benefits to the rural people through watershed protection, tourism, wildlife management, grazing, fuel wood, etc. Personnel trained to appreciate such broad based management concerns are urgently needed to coordinate activities of staff involved in several disciplines.

The authors propose a training program to address these needs. Potential participants would be persons with previous training in the traditional disciplines who have had practical experience with a conservation agency. The course of study would involve two phases. The first six month session would be comprised of a series of courses taught by experienced teachers. These courses would cover material seldom offered in traditional resource education

programs, but which are considered extremely useful for personnel with management responsibility for large land areas and who also usually supervise personnel with training in several disciplines.

The subject matter covered would include basic integrated management planning, personnel management, budgeting/accounting, economics, rural sociology, extension-communications and community involvement. Additional material offered would be a review of principles of forest, range, wildlife, watershed, fisheries and park management so that the participants would obtain an awareness of management principles beyond their previous training and experience. This is important as they may well be supervising staff members trained in other disciplines. They must have a broad background in order to relate to various management needs on large areas.

The second phase of training would be a practical field exercise to develop a management plan for a specific area. A team comprised of the participants and advisors would spend about six months on location to collect information and develop the plan. The areas selected for the program should consist of parks or reserves with the surrounding buffer areas (conservation zones) which will be included in the plan. The participants will be involved with the development of goals, resource inventory, establishment of data bases, preparation of proposed budgets, staffing, extension/communication programs, visitor services, policy and area management plans.

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Areas chosen for the second phase would be nominated by host governments which would desire such assistance and would be willing to cooperate with the program. The authors feel that many countries would welcome such assistance and involvement. Financing of such a training program would require international and/or foundation support.

Teaching personnel for this program would be selected from experienced agency and academic personnel with good communications skills. The program may be accomplished in coordination with universities having natural resource departments experienced in developing countries. Participants who successfully complete the program would receive a certificate of completion or, with additional study, a graduate degree from a cooperating university.

The management personnel from the country who will be in charge of the area after the planning phase must be part of the training program. They should be the key individuals to be identified by the local community for continued involvement through the planning phase into the ongoing operation of the area. Other participants in the program will obtain practical experience which will be useful in developing similar programs in their own countries.

The program described here would provide the needed training to assist natural resource manager in effective administration of large rural areas containing parks or reserves. The managers must participate in the rural people's development programs to help coordinate his organization plans with their cultural and socio-economic concerns. He would also be involved with distribution of benefits occurring from the management of his area (tourism, hunting, animal culling, etc.) to the local peoples in a manner that would identify them as coming from the conservation area. In addition to these activities, the manager must be involved regularly with the local leaders, political administrators and educators so that they know the long term benefits of the conservation programs on his area and, in some cases, they may adopt similar programs on their own lands,

i.e. soil conservation, catchment protection, agro-forestry techniques, etc.

The education program proposed here would help prepare the resource manager of the future for the complex duties of managing large areas of rural lands. This manager must be familiar with the basic principles of the various resource management disciplines and an advocate of sound integrated land use management. He must also have adequate "people skills" in order to be involved in the local communities to gain acceptance and support for his conservation programs.

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CONFLICT RESOLUTION IN WILDERNESS DESIGNATION: CASE STUDIES FROM THE BUREAU OF LAND MANAGEMENT IN COLORADO*

ERIC FINSTICK

INTRODUCTION

Because of the diverse backgrounds of the participants at this conference, I feel obligated to provide some brief background information for those of you who may not be familiar with the U.S. Bureau of Land Management (BLM).

The BLM manages the nation's public lands which have not been incorporated into other management categories such as national forests, national parks or wildlife refuges. These BLM administered public lands include a total of 334 million acres (135 million hectares) throughout the western United States and Alaska. This represents an area larger than the combined size of West Germany, France and Spain. These lands are managed for a wide variety of multiple uses including recreation, livestock grazing, timber, minerals, fish and wildlife habitat, scenic and scientific values and wilderness.

The 1964 Wilderness Act initiated the formal system of wilderness protection within the United States. This law did not, however, address the public lands administered by the BLM. It wasn't until the Federal Land Policy and Management Act (FLPMA) of 1976 that BLM was authorized to study and recommend areas to Congress for wilderness designation.

THE BLM WILDERNESS REVIEW PROCESS

Consequently, BLM has embarked upon a comprehensive review and study of the public lands to fulfill the objectives of FLPMA. The 176 million acres (71 million hectares) of public land in the contiguous United States (excluding Alaska) were inventoried for wilderness characteristics and values. Nearly 23 million acres (9.3 million hectares) were identified as having potential for wilderness designation. These are 5,000 acres or more in size (2,000 hectares), roadless, lack human imprints and have outstanding opportunities for primitive recreation and solitude. They have been identified officially as wilderness study areas and are now being intensively studied through a detailed process of comprehensive land use planning, environmental impact analyses and reporting. Numerous opportunities for public involvement are provided throughout the process. Finally, mineral surveys are conducted for each area detailing the mineral resources that may be present.

Upon completion of these studies, recommendations are developed by BLM to designate some areas as wilderness and to return others to less restrictive forms of multiple use. These recommendations are reported to the President who subsequently makes recommendations to Congress. Only Congress can actually designate and set aside the areas as components of the National Wilderness Preservation System.

Although some BLM areas have been designated as wilderness by Congress, most BLM recommendations are in process and the results will be reported to the President by 1991.

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Since the passage of FLPMA about eleven years ago, a total of over 100 staff have been employed nationwide by BLM to fulfill the wilderness mandate of FLPMA.

The remainder of this paper will utilize a case study approach to illustrate the development of wilderness recommendations in the State of Colorado. Since most of the recommendations have not yet been finalized, it should be understood that the discussions are based on preliminary recommendations at this time.

The focus of the discussion will be the criteria and techniques being used to reach these recommendations and to resolve the unavoidable controversies that such decisions generate.

Many of the issues involved are universal and international in scope. Many of the remaining wild areas of the world also have mineral values, potential for hydropower, irrigation or valuable timber or other resources. Consequently, designation of park or wilderness reserves is intrinsically controversial, weighing alternative resource uses and trying to arrive at a balance. Wilderness designation is perceived on one hand as a "lock-up" of valuable, perhaps essential resources, and on the other hand as crucial for personal recreation, and as a biological and scientific reserve of global significance. "In Wilderness is the Preservation of the World," is not just a quotation from Thoreau but represents the viewpoint of millions. Between these diametrically opposed viewpoints, the managers making wilderness decisions or recommendations must walk a thin line.

It is hoped that the following illustrations of specific situations in Colorado will have relevance to other managers and decisionmakers in making wilderness and other resource allocation decisions. In my experience, examining actual on the ground situations is usually far more thought provoking and relevant than any amount of theorizing.

A CASE STUDY OF COLORADO

The BLM in Colorado manages 8 million acres (3.2 million hectares) of public land. Approximately ten percent or 800,000 acres (324,000 hectares) have been identified as wilderness study areas (WSA). Preliminary recommendations have been made to the public on all of these areas, but final recommendations have not been made to the President. Consequently, all of the recommendations discussed below are preliminary at this time.

In a few of the Colorado study areas, the recommendations are fairly clear-cut. Some areas have such outstanding wilderness, scenic and recreational values that arriving at recommendations to designate them as wilderness was not especially difficult or controversial. These include areas like the Powderhorn, Black Ridge Canyon and Dominguez Canyon. In these areas, the wilderness values predominate and the conflicting resource values are relatively minor.

Other areas with outstanding wilderness characteristics include the Dolores Canyon and the Gunnison Gorge. These canyons and rivers provide especially sought after opportunities for wilderness river rafting. However, they also have potential for dams which would provide hydropower or water for irrigation. The recommendations for wilderness designation of these areas illustrate the necessity to look beyond the boundary of the study area for a broader perspective. In both cases, there are extensive water projects upstream from these study areas that largely meet current needs. Other potential hydropower sites exist if they are needed. However, few other opportunities for quality wilderness whitewater rafting exist. In addition to the aesthetic and recreational values, the economic and tourism value of areas such as these is an increasingly vital component of Colorado's economy. Consequently, in spite of the water power conflicts, these areas are currently recommended for wilderness.

Certain other areas under study have significant wilderness values, but also have overriding conflicts with other potential uses. In many cases these conflicts are with mineral

development. Such areas include Little Bookcliffs, Oil Spring Mountain and Cross Canyon. Each of these areas contains significant wilderness values and other related special features such as the wild horse herd in Little Bookcliffs and the Anasazi archaeological ruins in Cross Canyon. However, each was also more than 50 percent leased for oil and gas prior to the passage of FLPMA and contains proven valuable reserves. FLPMA recognizes rights that existed prior to its enactment. Consequently these leases could be developed even if the study area is designated wilderness, unless the rights are bought back by the government, an expensive proposition, or allowed to expire by the oil companies. Although these areas remain very controversial because of their significant wilderness values, the areas are currently recommended as unsuitable for wilderness designation, because of the significant oil and gas resources they contain.

Some other Colorado study areas are ecologically and topographically very similar to nearby national forest wilderness areas and are smaller in size. These include areas like Troublesome and Castle Peak both of which also contain timber resources. These are also not recommended for wilderness.

In contrast, however, there are some study areas that are ecologically quite unique relative to currently designated or recommended wilderness area. Some of these, especially in the San Juan Resource Area, have not been recommended for wilderness because of local public opposition and because they were judged by field managers to be unspectacular and unworthy of wilderness designation. Some of these areas have been very controversial. There are few resource conflicts and the judgment that they are unworthy areas is disputed by environmental groups. Such areas include Weber and Menefee Mountains, two relatively small (6,000-7,000 acres)(2,400-2,800 hectares) isolated mesa areas near Mesa Verde National Park. They also include the small (8,000 acres)(3,200 hectares) but remote Tabeguache Canyon which contains archaeological ruins and 3 miles (almost 5 kilometers) of stream, canyon and dense riparian

vegetation. Finally in this category is a larger area (20,000 acres)(8,100 hectares) of badlands and sparse vegetation called McKenna Peak. This area is an example of a type of ecosystem and landform which is not represented in the wilderness system but which has not been subjectively considered to be of an overall quality to warrant its designation as wilderness.

The recommendations on these areas have not been well understood and are among the most controversial in the State. Final recommendations are now being developed. BLM managers will consider these public comments and concerns and have to weigh the issues of local opposition to any wilderness, strong support among environmental organizations, and the subjective judgments of uniqueness and significance, with the overall contribution that such areas would make to the National Wilderness Preservation System.

Red Cloud Peak Wilderness Study Area

With that brief overview of some categories of the Colorado study areas and their preliminary recommendations, I'd like to spend a few minutes on two especially complex and controversial areas.

The first is the Redcloud Peak wilderness study area (WSA) in south central Colorado. This is an area about 40,000 acres (16,000 hectares) in size. It contains spectacular alpine scenery, alpine lakes, and two 14,000 foot (4,270 meter) peaks with popular climbing trails to the top. It also contains 25 small inholdings and numerous mining claims with potential for precious metals, such as gold and silver, copper, lead and zinc and a world-class deposit of alunite (an ore of aluminum) on top of Red Mountain. Earth Sciences, Inc., applied for exploration rights in 1974 and was given permission to do so only by helicopter to preserve the wilderness value. However, they located a major deposit of alunite on top of the mountain. Mining of this deposit would strip 2,000 feet off the peak, clearly a major operation. The nearby town of Lake City, which was historically a mining town, is now principally a tourist town. There is substantial opposition to the mining, which would be

clearly visible from the town, and which would dramatically change much of the town's character. Like many such conflicts, this is clearly not just a wilderness issue. The mining proposal is very controversial by itself, even if the area were not considered for wilderness designation.

This is clearly an area with both exceptional wilderness and mineral values. The agency wilderness recommendation for this area is an attempt at compromise, recommending 75 percent of the study area. Although much of the area has identified potential for precious metals, this potential exists throughout much of the surrounding vicinity and is not unique to the study area. The wilderness, scenic and recreational values of the area are recognized to be superlative, however. The alunite deposit is also unique and potentially nationally significant. Consequently the area with alunite potential is not recommended for wilderness. This recommendation would allow a decision on the mining to proceed on its own merits, considering all environmental impacts. Congress could, of course, decide to designate all or none of the study area. The compromise proposal here heavily considers the scarcity or uniqueness of the various values and attempts to provide for the most significant. Most of the area is proposed for wilderness, but the alunite decision is allowed to remain open. It is an attempt to provide for the maximum resource values from the area. I think it's safe to say that while all parties do not agree with this recommendation, at least the reasoning is recognized as fairly clear and largely objective.

Cross Mountain Wilderness Study Area

The second especially controversial area may help to illustrate an attempt at a so-called "win-win" resolution of the controversy. This area is Cross Mountain in northwest Colorado. It includes most of a 14,000 acres (5,700 hectares) north-south oriented uplift that rises about 2,000 feet (600 meters) from the surrounding plains. The mountain itself is largely covered with pinon and juniper woodlands with open grassland area on top. The most spectacular feature, however, is the 1,000 foot (300 meters) deep canyon of the

Yampa River that cuts through the mountain in a east-west direction giving the mountain its name of Cross Mountain. The river provides nearly unrunnable rapids and boulders that challenge the most expert kayakers.

It also contains threatened and endangered species of fish (Colorado squawfish and humpback chub). The canyon walls provide hunting grounds and potential habitat for endangered bald eagles and peregrine falcons and nesting sites for golden eagles. The mountain itself provides prime habitat for deer, elk, bear and bighorn sheep, contains archaeological sites and a small cave. Taken together, these attributes make up a superlative and unique natural area with clear wilderness values.

The area has value for other uses, however. A major 260 foot (85 meters) dam has been proposed at the mouth of the canyon that would back water up through the entire canyon providing hydro-electric power and flat water recreation in a spectacular setting. This project was touted locally as a salvation for the seriously depressed economy of the nearby town of Craig, Colorado. Parades have been sponsored and bumper stickers sold supporting the so-called Juniper-Cross Mountain project. The project would include two separate dams, and cost estimates ranged above 200 million dollars. Although the entire project still has strong local support, the cost and the lack of demand for electricity make the Cross Mountain part of the project currently uneconomical, while the related Juniper Dam project remains questionable.

In addition, there are indications that the area may be underlain by large quantities of oil and gas. Although geologically the area appears very favorable, the only exploration holes drilled nearby have been dry. Nevertheless, the potential exists for substantial reserves as yet unproven.

The area was not recommended for wilderness in the Draft Resource Management Plan because of the hydropower and oil and gas potential. During the public comment period, the wilderness supporters mustered substantial

comments for wilderness designation. This support coupled with the lack of hydropower demand, the lack of proven reserves of oil and gas and the depressed oil demand, resulted in a reevaluation of the recommendation. An innovative, but still controversial proposal was developed attempting to provide something for each of the interests--an attempt at a "win-win" compromise.

The area is currently being recommended for wilderness designation. While that would probably preclude the Cross Mountain portion of the water projects, it would not affect the more feasible Juniper portion. The recommendation also contains a proposed condition that leasing for oil and gas, normally prohibited in wilderness, should be allowed with no surface occupancy stipulations. This would prohibit any surface use or disturbance within the wilderness. It would, however, provide a possibility that at least some of the oil and gas reserves that would be discovered could be recovered through drainage or directional drilling from outside the area. While that recommendation remains very controversial, it does illustrate an attempt on the part of BLM management to offer an equitable solution to what could be viewed as a no-win conflict. While such an attempt will rarely satisfy opposing interests, it does serve to demonstrate a concern on the part of BLM management for each of the competing values.

SUMMARY OF TECHNIQUES TO RESOLVE CONFLICTS

I'd like to summarize and re-emphasize some of the considerations, techniques, or criteria used in these examples to resolve conflicting values in making wilderness recommendations.

Eliminate Conflicting Areas

One simple technique often used is to eliminate the portion of the area with the highest level of conflict and recommend the remainder of the area if a viable and manageable wilderness remains. This may be appropriate if the competing values are judged to be more significant nationally than the wilderness values.

This is essentially what was done in the case of Redcloud Peak.

Other factors were also considered there, however. It is virtually always important to look beyond the boundary of the study area to obtain a perspective on the competing values. While two seemingly balanced values may be competing within the WSA, the relative importance and scarcity of these values when considered in a regional, or even national context, will often provide the clue to a workable resolution. In the case of Redcloud Peak, the existence of 14,000 foot peaks and spectacular alpine scenery in one part of the area and an apparently nationally significant alunite deposit in another part, led to the recommendation to designate part and leave the option open for future development of the mineral.

Compare with Wilderness Values Outside the Study Area

In some cases, comparing relative wilderness values outside the study areas led to no-wilderness recommendations where much larger designated wilderness areas with similar characteristics already existed. Such a comparison could equally well lead to a recommendation for wilderness in a situation where an area contained valuable coal or hydropower potential, but where resources or other hydropower sites are relatively abundant outside of the study area.

Future manageability of the area must be an important concern. Some areas such as Oil Spring Mountain contain so many inholdings, valid pre-existing mineral leases or claims that it is not likely that the wilderness character could be preserved unless Congress is willing to allocate large sums of money to purchase the rights.

Finally, it is probably most important to keep an open mind to innovative or creative solutions to conflicts, considering unconventional approaches, such as allowing leasing with no surface occupancy as was done for Cross Mountain. In other areas, compromise could potentially be reached by

eliminating areas with the greatest conflict while expanding boundaries of the study areas elsewhere. Although no good example of this approach has yet occurred in Colorado, it could be an appropriate resolution where significant natural values exist outside of the study area.

The above examples represent relatively concrete techniques and criteria, illustrated by specific study areas in Colorado, that have been used to reach wilderness recommendations. These factors should have applicability to other areas under consideration for wilderness or other natural resource protection measures.

CONCLUSION

In addition, however, there are some more general underlying themes that are apparent from these situations taken as a whole. These have even more widespread and far-reaching implications for anyone engaged in such a natural resource allocation process. I would like to conclude with some personal observations and philosophy regarding the overall approach to wilderness or other natural resource decisions.

It is often said that if you are being criticized from all sides, you must be on an appropriate middle ground. While this may at times be true, it may at times mean that our analysis and rationale are not objective or supportable. The goal should rather be to have all factions recognize that a well thought-out decision was made without necessarily agreeing with your conclusions.

In order for this recognition to occur, the manager must be objective and maintain a broad perspective on all the values involved. The recommendations will still be controversial, but if they are reached in an analytical, rational way the analysis will remain relevant to any future political or other designation processes and the opposing parties will at least be able to recognize analytical objectivity in the process, where often they perceive an irrational bias.

Most of the Colorado recommendations are in fact recognized as reasonable, if not supported, by the involved interest groups. A few, such as those for the San Juan Resource

Area, have not been understood and are perceived as biased.

It is important that such perceptions be dispelled, either through better communication of the reasoning or by changing the recommendations. In cases where the perceptions of bias dominate, the subsequent political decisionmaking process becomes chaotic and the agency recommendations become secondary to the political process.

Worse, however, is the fact that the related resource values and manageability of issues also become obscured by political considerations. The process often becomes characterized by political horse-trading and dominated by negotiations such as -"I'll drop this area in you district if you'll support designation of the area in mine." Decisions reached in this manner may result in the most deserving areas from a resource standpoint being allocated to marginal values such as firewood cutting, while areas with little or no wilderness values are designated. This has happened to a limited degree in previous Colorado legislation regarding Forest Service wilderness, and it occurred in the designation process in an area of southern Utah where some areas were designated as wilderness that have roads and active mining within their boundaries.

While such lack of concern for resource management may or may not occur in any political process, the risk is clearly much greater where the agency recommendations are not balanced or understood or not perceived by the interest groups as objective and reasonable.

Finally, I'd like to add one last example of an even more disastrous result. While this is not a wilderness-related example, it does illustrate rather graphically the necessity for developing a public understanding of the natural resource allocation proposals. The consequence of complete lack of understanding on the part of the affected publics can be a complete failure of the proposals, whether they be wilderness recommendations, or in this case a proposed tantalum processing plant in Thailand. Two and a half years of disputes followed the plant proposal, during which little effort was made to

deal with public concerns. The results of environmental impact studies were not made public and the possible impacts of the plant on the local populace and the tourist-related economy were not discussed with the residents. In the end, some 10,000 of the local population became so incensed with the possible effect of the plant that they rioted and burned the plant to the ground on June 23, 1985.

It is fortunately unlikely that a recommendation for or against wilderness designation will result in a riot and an agency office being burned down. But lack of public understanding of the proposals can and does affect agency credibility and subsequent political decisionmaking. A balanced logical and manageable wilderness system starts with balanced, objective and well-communicated output from the land managing agency and the interested public groups.

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