Strengthening Protected Areas through Philosophy, Science, and Management: A Global Perspective

Harold K. Eidsvik
Canadian Parks Service
Hull, Quebec

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As the opening speaker at this International Conference on Science and the Management of Protected Areas, I would like to extend my congratulations to the organizing committee and all of their collaborators. The topic is timely, the breadth of the subject is vast, and the program is inspiring. I feel comfortable that the next few days will expand our knowledge and in due course influence how we manage protected areas.

To move science into the forefront of our management decision making processes is one of the challenges of this conference. Science cannot, however, help us attain our objectives if our objectives have not been clearly established (Table 1). We cannot develop science-based technology to support management unless we know what we are trying to achieve.

We are concerned with natural areas at various stages of evolution and under different regimes of management. Frankly, I have found it extremely frustrating trying to build linkages between science and management. There seems to be no beginning and no end, everything is abstract, and this is the reality of nature.

Table 1
Primary Conservation Objectives for Protected areas

- Maintain essential ecological processes and life support systems
- Preserve genetic and biological diversity
- Protect aesthetic values and natural ecosystems
- Conserve watersheds and their production
- Control erosion, sedimentation, and soil depletion
- Maintain air quality
- Protect habitat of representative, and rare and endangered, species
- Provide opportunities for ecotourism and recreation
- Provide opportunities for research, education, and monitoring
- Contribute to sustainable use and ecodevelopment
- Protect natural and cultural heritage
- Retain future options

> We need to recognize that a concern with nature is not merely a scientific curiosity, but a subject that pervades philosophy, theology, aesthetics, and psychology. There are deep reasons why we desire a balance and harmony in the structure of the biological world and that we seek to find that structural balance, just as our ancestors desired and sought that kind of balance in the physical world.[1]

NATURE, CULTURE, AND THE PROTECTED AREA MANAGER

As park managers, our culture reflects writers such as Muir, Marsh, Thoreau, Olmsted, Leopold, Harkin, Mather, Sarasin, and Nash. We have a built-in culture which is different than that shared by the Gifford Pinchot utilitarian school of forest resource management. Failing to make our cultural assumptions explicit is perhaps the root cause of our failure to communicate conservation concepts to many foresters, the mining community, and other economically driven decision makers.

In brief, we must be explicit about where we are coming from; we cannot assume that everyone has the same ideology.

THE FIRST 100 YEARS

As protected area managers, we have for 100 years "managed" pro-

[1]D. Botkin, *Discordant Harmonies* (New York: Oxford University Press, 1990), pp. 188-89.

tected areas on a non-interventionist basis. Where we have intervened, it has been to favor "good species" over "bad species." With respect to habitat, we stopped fire, which we believed to be "bad." Other than this, we believed that nature should prevail. As Thoreau once said, "In wildness is the preservation of the world." This concept of non-intervention is, however, changing.

The Current Scene

The massive devastation to the vegetation of Tsavo [National Park] in Kenya and the ultimate decision to cull the elephant herd in the mid-1960s marks one of the earliest controversies which led to the growing acceptance of today's interventionist philosophy.

Because of our long tradition of non-intervention, to abandon this belief in the constancy of undisturbed nature is psychologically disturbing. As long as we could believe nature undisturbed was a given, we had a comfortable basis upon which we could judge our actions. Abandoning this base leaves us uncomfortable.

We do not have a strong rationale for charging off in new interventionist directions. E.O. Wilson tells us that we have somewhere between 5 and 30 million species on earth; of these, 1.4 million have been named. The question is: If we don't even know the names of most of the species with which we work, how can we embark on an interventionist program at the ecosystem level?

I guess the simple answer is that we have no choice: the world is changing rapidly and relatively small protected areas will not survive without intervention. And that requires better science than we have been able to deliver to date.

Knowledge and Management Technology

Back in 1972, Morton Boyd of the U.K. Nature Conservancy wrote that "the 'scientific management' of a national park is talked about as a reality, when, in the vast majority of cases, it is a figment." The lack of commitment of financial resources makes the management of the natural resources in parks—as opposed to road building, catering, and law enforcement—something to talk about rather than to do!

Last year, Howard Chapman, retired regional director of the Western Region of the U.S. National Park Service, said "it is unconscionable that there is not a more comprehensive science program" in the U.S. national parks."[2] The circumstances are not dramatically different in most protected areas.

Underlying the concerns about our lack of species knowledge and Boyd's and Chapman's about the lack of investment in science and its application (technology) has been an assumed myth of nature in balance. This has been reflected in the concept of non-intervention. However, as our understanding of the dynamic nature of nature grows, the need for intervention through management action is becoming the accepted route for protected area management. The

> change in perception of nature and the new answers to the ancient questions

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2 Howard Chapman, "Thoughts & Observations from an ex-Regional Director," *The George Wright Forum*, Vol. 7, No. 4 (1991), p. 45.

about nature arise from new observations and new ways of thinking that even now seem radical. The transition that is taking place affects us today and will continue to affect us deeply, in ways that may not be obvious, for decades.[3]

Science can help to manage protected areas, but it must be placed in context. Dan Botkin does this admirably in his new book *Discordant Harmonies:*

> A harmony between ourselves and nature depends on—indeed, requires—modern technological tools to teach us about the Earth and to help us manage wisely what we realize we have inadvertently begun to unravel.
>
> From the new perspective, nature does not provide simple answers. People are forced to choose the kind of environment they want, and a "desirable" environment may be one that people have altered, at least in some vicinities some of the time.[4]

Some elements of this approach are outlined in IUCN's framework for protected areas (Table 2). Within the framework, scientific reserves and wilderness areas (Category I) are intended to provide the least disturbed ecosystems for scientific monitoring, baseline studies, and the conservation of biological diversity. Clearly, research into the functioning of ecosystems is one of the central reasons for the existence of Category I protected areas. Without such activity, biodiversity will indeed be at risk.

At the other end of the scale, protected land- or seascapes (Category V) incorporate natural areas which have undergone considerable cultural transformation, either as result of a long history of human occupation such as the national parks of the United Kingdom or through industrial transformation such as the Rideau Canal system. Also incorporated in this category are many marine parks and coral reefs. In between these two extremes are traditional national or provincial parks (Category II), natural monuments (Category III), and habitat and wildlife management areas (Category IV).

Protected areas cannot exist in isolation from other forms of land use. They must be integrated into broader systems.

Having identified categories of protected areas as a component of global planning, attention must be turned to their management. The elements of protected area management are: law and policy, identification and selection, establishment, planning and management, and monitoring.

LAW AND POLICY

Governments clearly have a critical role in creating a favorable environment for the establishment and management of protected areas. For example, legislation, funding, and tax structures which encourage private incentives are relatively well developed in the United Kingdom and the United States, though the same cannot be said of Canada. It is an area of policy which requires further research, as well as public education and communication.

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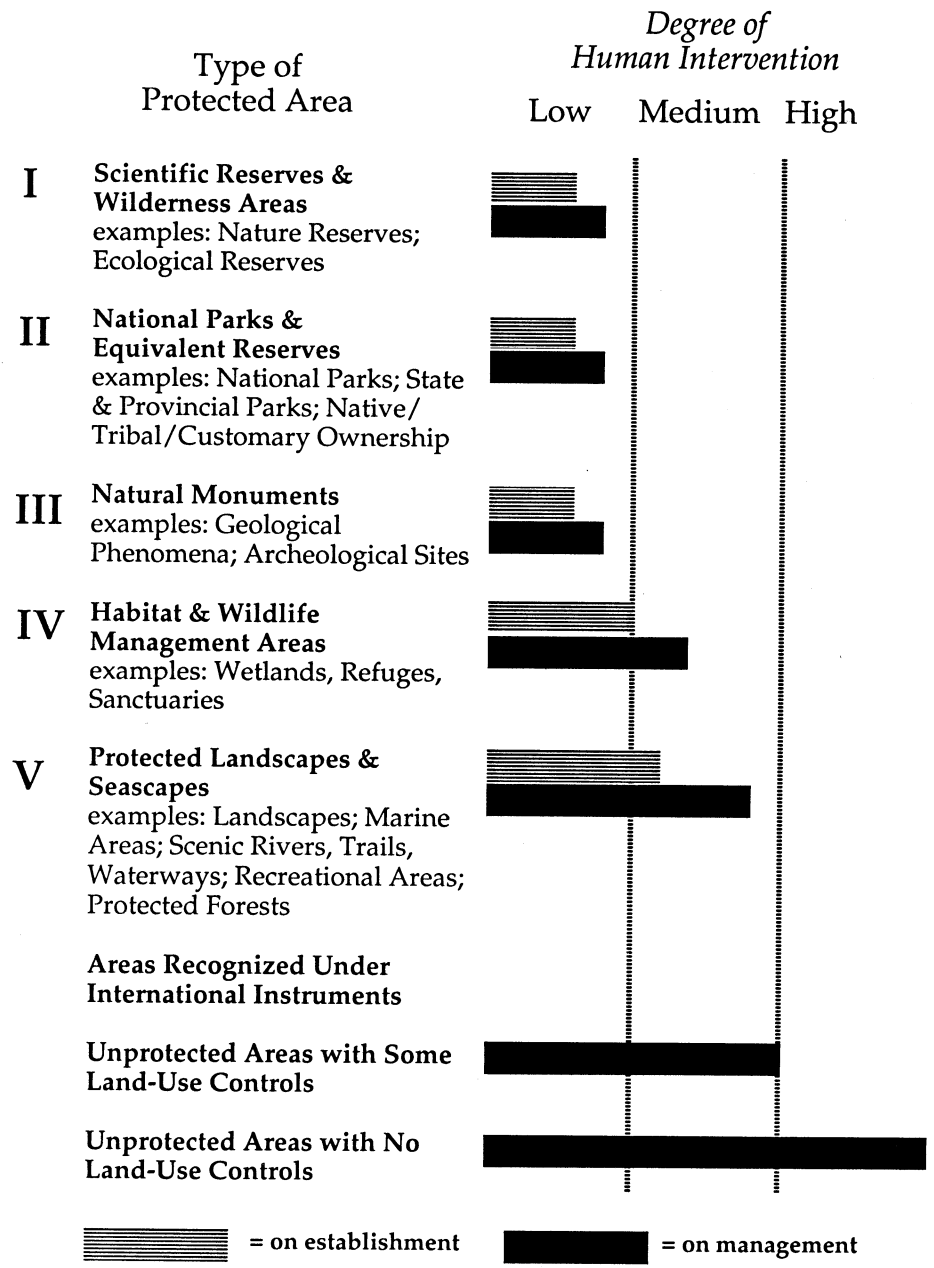
[3] Botkin, p. 189.

[4] *Ibid.*

Table 2
IUCN's Framework for Terrestrial and Marine Protected Areas



IDENTIFICATION AND SELECTION

Protected area identification and selection can be divided into two major periods: pre- and post-1960. Until 1960, the concept of representation on a systematic basis was the exception. Subsequently, developments of concepts such as "natural regions" began to evolve. The scientific basis for the identification and selection of protected areas continues to evolve.

In 1972, Raymond Dasmann, through IUCN, published a first effort at global systems planning. This was followed by Miklos D.F. Udvardy's seminal work in 1975. During this period, the USNPS and the Canadian Parks Service were establishing systems plans based on physiography and vegetative systems. Subsequently, Unesco adopted Udvardy's classification of realms, biogeographic provinces, and biomes as a basis for the global biosphere reserve network.

Research continues to improve upon the classification of large geographic areas. Canada has now been classified into ecozones (15), ecoprovinces (40), ecoregions (177), and ecodistricts (5,400). This process illustrates how, with the use of satellite imagery and Geographic Information Systems (GIS), we can improve our identification and selection of protected areas at the macro-scale.

In Canada, research at the University of Waterloo led to the "ABC"approach to inventory and selection. Briefly, this involves an inventory of abiotic and biotic resources, followed by an examination of cultural elements.

The ABC method is a classic example of the transfer and integration of scientific information into applied planning methodologies used within the Canadian Parks Service.

From a national parks perspective, if abiotic and biotic criteria representative of an ecoprovince are found in a locale which is a "gap" in the system of national parks, a potential new park, referred to as a National Area of Canadian Significance (NACS), is identified. Establishment of a new national park is a cultural and political decision involving local people as well as federal, territorial, and provincial governments. Several NACS may be found within one ecoprovince, and abiotic, biotic, and cultural values are assessed against broad criteria to establish objectives for a potential new park.

ESTABLISHMENT

As a part of the planning process, it is essential to separate "establishment" from "identification and selection." The latter are technical and scientific decisions, whereas establishment is a political process. It may proceed rapidly if the managing authority acquires or owns the land, e.g., Mingan National Park Reserve, or it may be a lengthy process where native or local people are involved, e.g., Grasslands National Park or the East Arm of Great Slave Lake, where 30 years have passed since the early initiatives were taken.

Protected areas have been around for at least 2,000 years. They were initially established for religious, aesthetic, or ethical reasons. In the first category, we could include Aboriginal sites and well-defined religious sites, such as the Bo Tree in Sri Lanka or Mount Taishan,

where Confucius meditated. The objectives of these areas were generally quite clear.

It is when we begin to examine areas selected for aesthetic or ethical reasons that our objectives become less clear, e.g., Yellowstone, Banff, Tongariro, or Tsavo.

Essentially, objectives should flow from early research undertaken during "systems planning." However, since this did not occur until the early 1960s, we have many protected areas without clear objectives. The lack of clear objectives is a root cause of public and bureaucratic misunderstanding of the fundamental purposes of many parks.

The establishment process involves building in safeguards related to the future ecological integrity of areas. Is the area an independently operating ecosystem? What considerations have been given to water quality and quantity? What considerations have been given to air flows? Is climate change a factor? Historically, we were satisfied that bigger was better; this is probably still a truism, but what corridors and linkages have been provided for? Is the protected area a factor in future natural resources development? There are myriad questions.

Fundamental research issues remain. For example, what is representation of an ecoprovince, how many areas are needed, what area (size) should they incorporate? In light of this, Canada's Green Plan 12% solution sounds simple!*

* Canada's national environmental plan calls for incorporating 12% of the total territory as protected space—up from about 7% today.

PLANNING & MANAGEMENT

There is a wealth of information on most areas that have been studied. My deep concern remains, however, that most of this information remains in the files of a fisheries biologist, an entomologist, an amateur ornithologist, an archaeologist, museums, universities, etc.

Federico Mayor, director general of Unesco, recently said, "We must try to make scientific information available to decision makers. Not only do politicians want to know what scientists are doing—they have to know." In reality, the concepts of planning and managing national parks have taken on a scientific flavor only in the last thirty years—and that may be stretching it. Prior to this, with a few exceptions, parks were managed on the basis of intuition and judgment. Both will continue to be necessary, but scientists must provide a sound

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The federal government has committed to:

- establishing at least five new national parks by 1996;
- negotiating agreements for the remaining 13 parks required to fill gaps in the terrestrial system by 2000;
- establishing three new national marine parks by 1996, including South Moresby/Gwaii Haanas and Saguenay; and
- establishing three other national marine parks in areas to be chosen by 2000.

In addition, the government has promised to fill thematic gaps within the national historic sites systems by commemorating 15 new sites by 2000. Government of Canada, *Canada's Green Plan* (Ottawa, 1990), pp. 79-80, 89.

intellectual base upon which to narrow these judgment calls.

MONITORING

Nature, like politics, is a dynamic process. Thus, periodic reviews of the effectiveness of management must be undertaken. Preferably, monitoring will demonstrate that we are not going in circles but are moving forward in an iterative fashion on an inclined spiral.

CONCLUSION

As we move away from a concept of nature as a static force to nature as a dynamic force, we need more research and better science to guide our management. We also need to enhance our managerial abilities in framing research programs and utilizing the results.

As managers of protected areas, we live with an assumption that large areas require less management intervention than small areas. Wilderness, on the one hand, and a zoo, on the other, are often used to illustrate this assumption.

A second assumption is that small areas require a stronger scientific foundation for their management than do large areas.

As a somewhat distant observer of the tuberculosis–brucellosis debate in, within, and between wood bison, plains bison, and hybrid bison in Wood Buffalo National Park, I am not convinced that big is always better, safer, or in need of minimal intervention and minimal science.

Canada's park managers are now carrying out gene typing of three different kinds of bison to find a conservation solution to an alleged problem in one of the world's largest national parks. At the root of the issue is the need to re-examine some untested assumptions about the non-interventionist policies of most park agencies.

Botkin, in *Discordant Harmonies*, calls for investments in ecosystem and biodiversity understanding on a scale of the massive investments of the U.S. Geological Survey. Current efforts by park agencies amount to little more than tinkering.

The Swedish Environmental Protection Agency has created a research council to establish a scientific basis for nature conservation. This research is funded mainly at universities, a concept which we all need to endorse.

> Howard Chapman has called for an altogether different relationship between scientists and managers. Since they are not natural partners, it will require real dedication to forge the kind of partnership to meet the kind of aggressive program envisioned. To meet such demands, the [U.S. National Park] Service will have to go to Congress and seek a charter that recognizes science as a major program that requires funding stability to be an effective long-range effort."[5]

In Canada, we tend to admire the science commitment of the USNPS. If they are not satisfied, we have a long way to go.

Dr. [Gro Harlem] Brundtland [chair of the U.N. World Commission on Environment and Development], the upcoming World Conference on Environment and Development [UNCED, scheduled for Brazil in June 1992], the Green Plan, the Group of Seven, and the Global Environmental Facility [a newly launched conservation banking pro-

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[5] Chapman, "Thoughts & Observations," p. 46.

gram] all call for sustainable development. We have a vast knowledge of our abiotic resources and the macro-socioeconomic system. To live in a world that will not survive without the effective management of its biological diversity means that society is not sustainable. We must stop being apologists for nature and culture. We must shift investment from the *abiotic* dead to the *biotic* living world. Scientifically managed protected areas are a critical element in ensuring biological stainability. We need to shift from seeking an economically sustainable world to a biologically sustainable planet. This needs better science and better management.

None of the elements of protected area management can be fully developed without a scientific approach to the solution of problems. Our major failing is that we neither invest sufficiently in the subject or communicate results effectively.

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Errata

In the last issue of the Forum, a couple of typesetting mistakes played havoc with the article "National Parks in the Eastern United States: The Mammoth Cave Experience," by Bruce J. Noble, Jr. Two lines were repeated at the bottom of page 40 and top of page 41. More critically, some words were omitted from the final paragraph on page 41 carrying over onto page 42. That paragraph should read:

> "In addition, the Dust Bowl had left the American public with vivid images of clouds of topsoil blowing across the Plains states. At least part of the Dust Bowl phenomenon resulted from the extension of agricultural pursuits into regions of the country that were not ideally suited for farming activities. As a preventative measure, natural parks would serve as bastions of correct conservation practice where the virtues of conserving timber and preventing topsoil erosion could be publicly demonstrated. Given the perceived magnitude of such environmental threats during the 1930s, Mammoth Cave National Park advocates proceeded on the assumption that they were serving the larger interests of society by promoting the conversion of marginal Kentucky farmland into a natural preserve."