NATIONAL PARKS:
FROM VIGNETTES TO A GLOBAL VIEW

A Report from the Commission on Research and Resource Management Policy in the National Park System

Yale University *New Haven, Connecticut 06511*

SCHOOL OF FORESTRY AND
ENVIRONMENTAL STUDIES

Office of the Dean
Sage Hall
205 Prospect Street

Telephone: (203) 432-5109
Telex: 5101012363 Yale FES
FAX: (203) 432-5942

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Paul C. Pritchard
President
National Parks and Conservation Association
1015 31st Street, N.W.
Washington, D.C. 20007

Dear Paul:

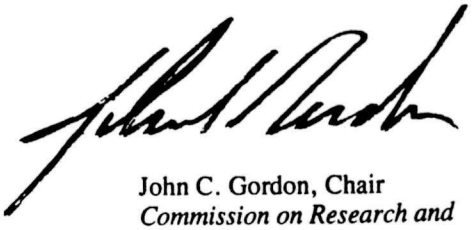
We herewith transmit the report of the Commission on Research and Resource Management Policy in the National Park System. We have been described as a successor to the prestigious group chaired by Dr. A. Starker Leopold that presented its findings in 1963. It is a description we have taken as an impetus to hard work. We believe that, even after 26 years, the Leopold Report remains a valuable document, and one not ready for discard. Times, however, have changed and along with them science, the parks, the American people, and the global environment and our perceptions of it. Indeed, this report is really to the American people, because the parks are theirs.

The environment is now a subject of overriding importance, and as a result the goals of the National Park System have a new urgency. There are many serious threats to a world environment livable in both cultural and environmental dimensions. The Leopold commission and many other formal and informal reports and studies have urged action, and some has resulted. But we need more, now, and on an unprecedented scale.

An even earlier Leopold urged the American and world publics to expand the human concept of ethics to include a land ethic. Our hope is that the National Park System and those who love and manage it will become teachers and students of the land ethic and transmit their knowledge to the people of America and the world. We have tried, as a group of 17 diverse people, to say what we think will make this happen. In doing so we have attempted to stay above specific issues in specific parks. But we believe we have provided a framework in which significant controversies can be resolved. We do not presume to provide management recipes; ecosystem management (which we do advocate) often finds recipes antithetical to site and goal-specific management. It has not been our intent to make policy for the parks, which rightly is the business of the branches of government representing the American people. We have, however, suggested concepts and general actions to ensure that the National Park System can continue to fulfill its mission in the face of serious challenges.

This report is not a scholarly study of parks. Rather, it is the collective thought of a group of informed people aided tremendously by many people and organizations, including knowledgeable professionals in the National Park Service. But the conclusions are ours and ours alone. They are our best estimate of what must be done now if we are to realize the magnificent opportunity the National Park System presents, and to ensure its value for generations to come.

Sincerely,



John C. Gordon, Chair
Commission on Research and Research Management Policy Policy in the National Park System

EXECUTIVE SUMMARY

The National Park System is a magnificent and uniquely American gift to the American people and to the world. However, this system, a touchstone of grandeur, inspiration, and national pride, is caught up in our unprecedented environmental crisis. In a world becoming increasingly conscious of the value of rare species, the parks themselves are rare species.

The National Park Service has a unique mission in our society. The Act of 1916 that established the Service directed this organization to manage a diverse assemblage of special places in order to "conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for future generations." To meet the challenges of the twenty-first century imposed by this mandate, we propose a new vision for the National Park System to ensure its survival and enhancement—a vision that builds on the history and accomplishments of the National Park Service. Our hope is for a National Park Service strengthened in its commitment and ability to preserve resources, empowered by an expanded information and educational mission.

This vision is based on the principles of ecosystem management, by which we mean integrated management of both cultural and natural resources, based on sound research. The National Park Service cannot manage what it does not understand. Superior management expertise is also the basis for pursuing an outward view, an enhanced educational role for the National Park System. The National Park Service, among all federal land management agencies, has the preeminent responsibility for educating people about that land. This task must now energize Park Service stewardship in all of its dimensions.

In deepening the meaning and purpose of the National Park System, we also reaffirm the basic values upon which the System was created. As the National Park Service seeks to enhance its capability to respond to a changing world and an expanding mission, we see it as a tree growing to maturity, not as a new planting. We hope to foster the natural growth of the original institution. We recognize, however, that conflicts with parks will always be present, as will human inadequacies and changes of circumstance. The measures we suggest are intended to make these inherent conflicts and challenges more manageable.

In a time of finite resources and conflicting demands on the nation, it is important to remember that parks are not luxury items. The National Park System has the capacity to serve the entire nation and its dividends are infinite. Parks provide unique capsules of our culture and history, and refugia for the preservation of biological diversity. In the future, they may also provide invaluable baseline control areas for monitoring global change. And, of course, to their millions of visitors, the parks are wellsprings of deeper meaning in words unspoken.

For all these reasons, the National Park Service should focus on several major tasks, with the full support of the American people:

1. **Developing and using the concept of ecosystem management,** emphasizing the relationship among the natural and cultural resources of the system, and recognizing that an ecosystem encompasses past and present human activities. Units of the National Park System must become premier examples of the integration of natural and cultural values and systems. There are few other opportunities for such developments.

2. **Implementing a research program** to meet the needs of the National Park Service and to educate the public. Cooperative research, undertaken in conjunction with other federal and state agencies, universities, and private groups, can be the key to integrated management of ecosystems that include lands outside formal park boundaries. Studies in the natural sciences, in history and historic preservation, ethnography, archeology, and social sciences are all fundamental. It is critical that the National Park Service understand its resources and its visitors and integrate human activity successfully into park management. The research program should draw in and draw on outstanding researchers in appropriate fields, promote information-sharing with other nations conserving world park resources, and move generally toward improving the quality of life.

3. **Adopting professional standards** for the recruitment, promotion, and continued education and development of the people who manage the National Park System. The increasingly complicated and technical tools needed to manage complex systems demand a high degree of professionalization. The organizational ethos of the National Park Service should now reflect this in a fully professional staff.

4. **Educating the American and international publics** about natural and cultural systems and the ways in

which they change. This education should be a primary outward goal of the National Park Service. Education of the public is a critical output of the system, linking diverse sites, their values and purposes, and illuminating what is happening to natural and cultural resources both inside and outside the system. Education goals should be established for each unit of the National Park System. These goals will also become tools with which to guide management. They must contribute to the development of a conservation ethic among all segments of society, including those traditionally underrepresented in park constituencies, such as minorities, single-parent households, the handicapped, and the economically disadvantaged.

INTRODUCTION

The bold experiment that began at Yellowstone in 1872—to set aside areas of exquisite beauty and cultural value for the benefit of current and future generations—has matured into a vital national and international legacy. The U.S. National Park System, now 80 million acres spread throughout 354 units, includes not only the magnificent natural landscapes, such as the Grand Canyon and Yosemite, but also the pristine wilderness surrounding Denali in Alaska, the hallowed ground of Gettysburg, the quiet grace of Anasazi ruins in the Southwest, and the proud visage of the Statue of Liberty. The National Park System is the embodiment of the values shared by many previous American generations to preserve their unique heritage for the enjoyment of future generations. The spiritual value of these national treasures to inspire, to engender a sense of shared responsibility and stewardship, and to increase ecological and cultural knowledge, cannot be overestimated.

The National Park System is a magnificent and uniquely American gift to the American people and to the world. For many, the parks are prime recreational destinations, places to picnic or hike in beautiful scenery or glimpse the nation's history. The National Park System has always served these purposes, and served them well. It should continue to do so, because the parks represent a democratic ideal, that even the greatest treasures should be available to all.

But virtually all of our parks are now threatened, frequently by forces originating outside their boundaries. If our national inheritance is to inspire us for yet another century and beyond, we the people of the United States, and the National Park Service on our behalf, must make some changes. We must learn to understand cultural and environmental change affecting the parks, preventing it where it undermines the basic values and purposes of the parks, and accepting or mitigating it where we must.

This report is preceded by over 100 years of National Park management policies. For 50 years after Yellowstone National Park was established in 1872, park superintendents were preoccupied with promoting and developing the parks to accommodate visitors. They saw little need for actively managing wildlife or other resources. Located for the most part in sparsely populated areas, the parks were considered islands far removed from threats or encroachment.

Management decisions during that time were based on inadequate scientific knowledge and were often made with the visitor uppermost in mind. This led to what we now perceive as misguided policies, such as decimation of predator populations, suppression of forest fires in fire-dependent ecosystems, and poor assessments of the long-term impacts on resources by park development projects. Important cultural resources were sometimes removed to "create" natural parks.

In the 1930s, the National Park Service experienced significant change. During this decade, scientists like George Wright, historian Ronald F. Lee, and others brought new and much-needed expertise to the National Park Service. Wright believed that science-based management was essential if the great natural areas were to be preserved. Using his own money, Wright hired assistants to help him begin wildlife inventories and prepare management strategies. Wright's untimely death slowed this initiative within the Service.

At the same time, Lee and his colleagues turned cultural resource management away from sentimental amateurism to base it on the principles of appropriate scholarly disciplines, especially archeology, history, and historic architecture. The 1933 transfer of battlefields and other historic properties to the National Park Service, the initiation of the Historic American Buildings Survey in the same year, and the Historic Sites Act of 1935 together vastly expanded the National Park Serv-

ice's responsibility for cultural resources.

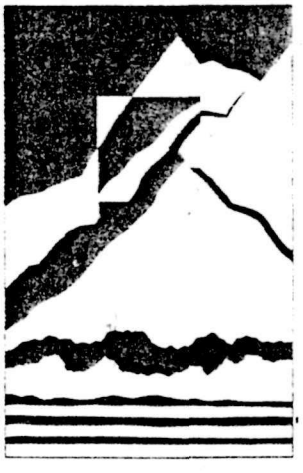
In the post-war years, the debate over park policies has been shaped by major trends: the massive park construction program known as "Mission 66" (to accommodate post-war increases in visitation), the broadening of the Park Service historic preservation mandate, the expansion of the system as a whole, and the realization that parks were suffering from a broad array of internal and external impacts. But without corresponding increases in resource management capability or data to quantify impacts, park managers had little power to stop "progress," especially when a park's success was measured by an increasing number of visitors. Despite some elevation of importance, cultural and natural resource conservation programs are still inadequately supported in comparison with their central importance to the mission of the Service.

In 1961, Secretary of the Interior Stewart Udall requested a report on how the Service should manage large mammals, such as elk, and other wildlife. The Leopold Report (prepared by a committee chaired by Dr. A. Starker Leopold) and another study of park science and research needs (the National Academy of Science's Robbins Report, prepared by a committee headed by Dr. William J. Robbins) were released in 1963. Both reports, and many subsequent studies, clearly articulated the idea that greatly increased and more credible research and scientific reasoning were essential to ensure enlightened park management.

At the same time, the National Historic Preservation Act of 1966 and a large body of other law gave the National Park Service the responsibility to lead federal, state, local, and private efforts to preserve cultural resources. The National Park Service has set the standards for historic preservation and cultural resource conservation within parks while gaining responsibility to coordinate the national historic preservation program with the states—the so-called "external" programs. However, a costly lack of coordination between in-park and external programs is one of the most harmful results of the strong orientation of the post-war National Park Service toward facility development and visitor services. Ironically, the external programs are better understood by mayors, governors, planners, politicians, and citizens than they are by many park superintendents and officials of other federal agencies whom the Park Service must lead in cultural resource management. New challenges now confront the Service. For example, the National Park System has been asked to play a major role in preserving our nation's industrial history by working with local governments to develop parks such as Lowell National Historical Park, and coordinate efforts like America's Industrial Heritage Project.

There are now 354 units in the National Park System, covering 80 million acres. In 1963, there were 191 units, comprising 26.5 million acres. The vast majority of this increase—almost 40 million acres—is Alaskan wilderness, which forever changed the complexion of the system, but also gave the National Park Service a fresh opportunity to "do it right the first time." Currently, the National Park Service possesses only scant data on Alaskan ecosystems, vast parklands that the Service is unprepared to understand and manage. The Alaskan parks also present a major responsibility for the National Park Service to respect the traditional lifestyles of Native Americans who, in this case, actually reside within parks.

The public is growing more aware of a threatened world biosphere. Today the world is threatened by global climate change, acid rain, nuclear waste disposal, stratospheric ozone depletion, species extinctions, and the loss of irreplaceable buildings and artifacts that define our past. Combined, these problems present the greatest challenge, and the greatest opportunity, the National Park Service has ever faced. The challenge is that park resources are severely threatened. The opportunity lies in the possibility of finding new dimensions of value for the parks. The relatively unaltered ecosystems of the parks can provide invaluable information and serve as an early warning system for many types of change. The inspiring places of our history can serve as metaphors for the diversity of America, and help sustain national unity. Only then can the National Park System continue to serve the nation as the preeminent link between our past and our future.



DEFINING THE ISSUES

The discussion that follows is based on the conviction that the National Park System must continue to provide enjoyment and inspiration to the American people and international visitors. To this end, we propose several general strategies: conducting resource management based on an ecosystem perspective, greatly strengthening the research program, increasing the professionalization of those who manage and study the National Park System, and expanding the educational mission. These strategies are interdependent: an improved ecosystem management program requires an adequate research base and professionals to implement it, and the information thus gained must be presented to the public effectively. Thus, although we discuss these goals separately, and subsequently list actions necessary to accomplish each, they are all essential parts of a whole and, in our view, crucial to the future of the National Park System.

Ecosystem Management

The National Park System was founded on the belief that selected landscapes and artifacts of our nation have intrinsic worth and that people benefit from their contemplation and enjoyment. All future benefits of the National Park System depend upon the integrity of this resource base. The fundamental obligation of the National Park Service is to protect these cultural and natural resources; resource management is thus the most critical task facing the Service. Only a continually improving, integrated management approach carried out by highly trained and motivated professionals can be sufficient to this purpose. Moreover, professionals at all levels must be held accountable for the resources with which they are entrusted.

The philosophy underlying management of park resources has evolved significantly since the establishment of Yellowstone. The first step in this evolutionary process was the prevention of poaching. The second was the control of specific features of the system, such as fire or predators, features that were considered destructive. The third step was development of ecological awareness, the attitude that natural components of a system are neither "bad" nor "good." Instead, they are all integral parts of the whole. In fact, in some cases, human manipulative activities, such as fire prevention or predator control, can be contrary to ecosystem health. The fourth step was recognition that resource degradation from human activities grows as the intensity of human use increases and, therefore, that limitations on human uses of parks are necessary. The fifth step has been the recognition in recent years that parks do not exist in isolation from neighboring lands and continents and that human activities occurring outside parks are having significant impacts on resources inside the parks. A sixth step in this evolutionary process is now being considered—the integration of park resource management into larger regional, and even global, environmental protection activities.

Ecosystem management is the paradigm providing the soundest philosophical and technical basis for stewardship of the National Park System. It can provide the best foundation for the dual cultural and natural conservation missions, and also for the expanded education mission of the National Park Service. This strategy is defined by James Agee and Darryll Johnson in *Ecosystem Management for Parks and Wilderness* (1988):

> Ecosystem management includes, within a given geographic setting, the usual array of planning and management activities but conceptualized in a systems framework; identification of issues through public involvement and political analysis, goal setting, plan development, use allocation, activity development (resources management, interpretation), monitoring and analysis. Such coordinated management is a process by which goal-oriented management can effectively occur; it is not an end in itself. Success in ecosystem management is defined by achieving goals, not by the volume of coordination.

Thus, ecosystem management requires goal setting for an individual park, definition of boundaries, developing and maintaining inventories to monitor success, and establishment of the information base necessary to understand and predict the behavior of the system and its components. One explicit assumption of such management is that ecosystem boundaries will often differ from political or ownership boundaries; therefore, the park and its goals must be integrated with the surrounding region, as neighbors have a direct stake in setting and achieving these goals.

The central theme of the Leopold Report was captured in the notion that national parks should be managed as "vignettes of primitive America" to preserve, to the maximum extent possible, the biotic assemblages that existed, or would have evolved, without the "discovery" of America by Columbus and subsequent European settlement.

The Leopold Report also recommended that park management policies should minimize human disturbance to park ecosystems, bring a halt to road construction and overdevelopment, and avert the use of hunting

as a wildlife management tool within the parks. At the same time, the aggressive stewardship of a professionalized Park Service should be encouraged by adopting a policy calling for "hands-on" management. The report was revolutionary, for example, in its proposals for the restoration of fire regimes in the parks. The report's philosophy is crucial, yet has been widely misunderstood; the Leopold Report never suggested that a Park Service commitment to "natural regulation" justified a laissez faire approach. We find Leopold's perspective as pertinent today as it was in 1963.

Interpretations of the phrase "vignettes of primitive America," however, have been debated, often polarizing rather than illuminating views on park management. We believe the Leopold Commission's intent was to encourage active management and not a fixation on some static primitive condition. The focus of management should be to maintain or restore native biota and ecosystems and to resist establishment of alien organisms. Where possible, ecosystem management should attempt to preserve natural processes operating at a scale consistent with the evolution of the ecosystem being managed. Though often fighting a losing battle, the national parks in Hawaii provide examples of attempts to restore severely damaged native ecosystems. Preserving the evolutionary matrix of environment and organisms is the transcendent task of managing ecosystem processes.

The concept of "naturalness" is not a simple and comprehensive guide for management. It will not anywhere substitute for identification of well-defined, park-specific, and research-based objectives. Dramatic and poorly understood changes are occurring both in environmental conditions and in the forces that disturb them. Defining "natural conditions" is therefore a difficult and continuous task. Recreating some past condition is typically impossible, even where it can be precisely defined. Evolving environments and, in the long view, evolution will present "threats" that cannot be resolved by recourse to "natural processes," and sometimes not even by vigorous manipulation. Ecosystem management, then, should focus on site-specific efforts to retain key resources directly serving park goals; creative solutions may not fit conventional wisdom about either nature or its manipulation. Nor should the transitory desires of park visitors be accommodated when they cause unacceptable impacts to park resources.

The Leopold Report provided the National Park Service with a critical push toward ecological management. Examples of progress across the system include efforts to remove feral animals, and develop combined natural fire/prescribed fire regimes in many National Park System units. Nonetheless, the resource management tradition of the national parks is rooted in scenery management —preserving or recreating various types of "facades"—and the Park Service has yet to fully transcend that emphasis to provide stewardship for the elemental components and processes that in many cases stand behind and compose the shifting face of the facade.

As a consequence of its charter, the Leopold Report did not address cultural resources. However, cultural resource management has undergone significant growth and evolution. In the early national park era, such resources generally went unrecognized, with the exception of visually spectacular prehistoric ruins in the Southwest. These were usually excavated, stabilized, and protected. Military parks were used to teach military tactics and to commemorate heroic acts. The National Park Service and its predecessors sometimes engaged in exuberant efforts to "reconstruct" destroyed resources. At the time, a sophisticated historic preservation ethic had yet to evolve, one where an understanding of history contributed to the preservation of authentic surviving buildings, structures, and objects. Little did they realize how unscientific their approaches would appear to later generations.

Mostly in post-war years, cultural resource disciplines have devised criteria, standards, guidelines, technical information, and methods of analysis that render their work more effective. An administrative structure has been developed to plan for and protect historic properties, not only within the National Park System, but wherever they may be found in America.

In the cultural resource area, the ecosystem paradigm can be achieved by integrating what is accomplished within parks under the aegis of cultural resource management plans, with what is done outside the parks under Park Service-financed state historic preservation plans and their counterparts on the local scene. This will require some modification to both sectors, but the result will add the strength, visibility, and prestige of the national parks to state and local preservation programs while simultaneously giving the national parks access to the influence of state and local government over uses of private property.

Implementing ecosystem management requires an extensive and sophisticated information base that is lacking for most natural and cultural resources within the National Park System. Accurate inventories are not generally available allowing resources to be lost without any knowledge that they ever existed. Little is known about the interaction of species and the ecological relationships of the parks with areas outside park boundaries. Existing biological inventories are heavily skewed toward the charismatic megafauna such as grizzly bear, bison, elk, and panther. Data on other species, such as inverte-

brates, plants and microorganisms, which may be important indicators of ecosystem health and function, are sketchy for most parks, nonexistent for others. At the same time, little is known about the relative importance of historic buildings and sites within the parks. A charismatic approach has also been typical with cultural resources inventories, as illustrated by the priority given cliff dwellings at Mesa Verde, when researchers consider the pit dwellings near the park to have greater scientific value.

Too often, there has been a tendency to neglect cultural resources in "natural" parks and natural resources in "cultural" parks. This must end. When a conflict arises between cultural and natural management goals (e.g. in restoring the historic scene at a national battlefield), decisions should be made by professional managers using site-specific information derived from research by professionals.

Techniques for monitoring and understanding changes in natural and cultural environments have become much more sophisticated in the past 25 years. The National Park Service has benefited little from new discoveries in genetics and population ecology, from our vastly increased understanding of the relationships of organisms and their environment at the ecosystem and landscape levels, and from improvements in technology, including the mathematical modeling of ecosystem behavior. The Service must begin to employ these tools immediately. The lack of progress to date is not surprising given the Park Service's minuscule research budget and the limited numbers of qualified resource professionals and researchers, in both cultural and natural disciplines, employed or supported contractually by the Service.

Ecosystem management is a developing methodology. Its continuing refinement is a major challenge facing the National Park Service. Some excellent beginnings have been made in some parks including the development of linked ecosystem concepts at Sequoia-Kings Canyon, inventory and monitoring systems at Channel Islands, and the interagency coordination effort centered on Yellowstone. Similarly, the regional preservation and planning approach employed at the Antietam National Battlefield is a precursor of ecosystem management at predominantly cultural sites.

The National Park Service should lead in further development and use of ecosystem management in park conservation and development. This will require integration with other federal agencies as well as with the extensive programs of the National Park Service that lead states, and local governments in planning for and protecting cultural resources.

Research

Research is basic to the mission of the National Park Service. Yet, the Park Service, unlike other federal agencies such as the U.S. Forest Service, lacks an explicit mission for research. Without a sufficient knowledge base, it is impossible to make wise management decisions or to design effective education programs. Research must be broad-based because the National Park System is huge and diverse and because its units have both cultural and natural resources which are affected by many factors. Research must also be ongoing, incorporating new techniques and interpretations as appropriate.

The biotic and physical resources of any area interact and continually change. Populations of organisms fluctuate with climate, through pest cycles, and as resources change through forest succession or other factors. The rates of these fluctuations depend on the rates of environmental changes and the life cycles and ranges of the resident organisms. Land features also continually change through natural processes, but generally over longer periods than the population fluctuations of organisms.

These interrelationships are complicated, and generally site- and organism-specific, yet they can be documented and understood. With this understanding comes the capability of managing, not only to achieve the presence of a desired species or ecosystem condition, but also to exclude unwanted species or conditions. The knowledge to reconstruct, or rehabilitate damaged ecosystems and the ability to plan for and mitigate undesirable changes, such as those induced by atmospheric pollution and climate change, spring from a coordinated program of basic and applied research. The Service's air quality research programs, for example, have pioneered visibility and transport modeling techniques that are advancing basic knowledge, and linking with regional and national data bases, while providing the Service with critical information needed to defend park resources from further impacts.

Implementing ecosystem management requires a quantum leap in both the quantity and the quality of research supported by the National Park Service. Much of the necessary information can only come from long-term studies as opposed to the current short-term, "brush fire" approach to research funding and design. Holistic, ecosystem-level investigations are necessary. Experimentation and scholarly investigation must become a regular part of National Park Service programs, actively encouraged rather than grudgingly tolerated. A major component of research must have a degree of autonomy from park management, to ensure

independent, credible scientific assessments.

With the appropriate research, inventory, and monitoring emphasis, the National Park System can provide benchmarks for measuring local or global environmental changes. It can warn the American and world populations about actual or impending losses of biological diversity, environmental degradation, and threats to the buildings, objects, and landscapes that are valuable reminders of our past. A strong research program, founded on cooperation between all park divisions and park neighbors, can heighten levels of management expertise, and lessen the fragmentation of nature and purpose implicit in the notion of political boundaries.

Monitoring populations and landscape patterns has a long tradition with well-developed research tools. But the approaches to community and ecosystem experimentation are only now being developed, and their full power is just being appreciated. Unfortunately, these approaches have not been fully developed within the parks, principally because of the lack of resources, but also because the need for them has not been articulated. A Park Service goal should be to understand the workings of all natural ecosystems within the parks so we can rationally manage them.

Managers at many parks are working diligently to implement ecological management, but are finding that scientific knowledge is lacking on many subjects, rendering the task difficult. Using zoning designation, some superintendents have classified small parts of their parks as Research Natural Areas, where scientific research is supposed to be given the highest priority, and restrictions are placed on activities incompatible with research. But few of these research areas are utilized effectively or made a part of an overall park management strategy. Great Smoky Mountains National Park, one of the 29 U.S. national parks designated as international Biosphere Reserves, is attempting to work toward ecosystem-based management, taking into account resources that lie outside the park boundaries. In August 1988, the park negotiated an agreement with five other federal, state, and local agencies to share data and cooperate in management of the entire southern Appalachian region.

In the area of cultural resources, research must transcend study of the lives of the great men and women whose homes are owned by the National Park Service. Since parks are for all people, they should also tell the stories of many peoples and times. Here, the concerns of the "new social history" are important. Minorities, women, and labor relations themes, for example, should be featured in the history and interpretation of a particular site. Research should also relate the events that took place within the often-artificial park boundaries to movements and events that took place outside the park. Coordination with historical and archeological societies can be as critical as checking documents in the national archives. National Park Service site-specific research should be placed in the context of broad patterns of American history. Ideally, this concern for all peoples who lived on or near the parks' lands, as well as the period of significance for the site, should be addressed in the legislative mandate in order to enable managers and researchers to tell a coherent story of landscapes modified over time by human activity.

The National Park Service owns thousands of buildings and sites and millions of artifacts that are the stage and props on which the drama of history unfolds for the visitor. These must also be as carefully documented as the lives of the "players." The Service has the unique nationwide mandate to preserve artifacts as diverse as Native American headdresses, the furniture at historic houses, and coal tipples. Most are preserved in settings as much like the original as possible, rather than in the controlled environments of modern museums. Only research can solve the many site-specific questions that this responsibility entails. The National Park Service must continue to play a leading role in research related to the conservation and preservation its artifacts, buildings, and sites. Because of the Park Service's role as the lead federal historic preservation agency, and its long experience managing its own sites, the historic preservation community looks to the National Park Service as a major source of up-to-date technical information and assistance.

Yet knowledge of cultural resources in the National Parks is critically inadequate. An enhanced inventory and monitoring system is needed to document artifacts and buildings and to identify threats to them. A 1987 Cultural Resource Summary and Action Program prepared by the National Park Service revealed that approximately 87 percent of the Service's almost 80 million acres has never been surveyed for archeological resources. Although data bases for historic structures and museum objects have recently been upgraded, they have yet to be fully coordinated; and an essential data base of archeological, ethnographic, and historic sites is still in the conceptual stage. Fifty-three percent of known cultural sites have not been evaluated to determine their significance, and 78 percent of identified cultural sites are in unknown condition. Although museum objects are now being cataloged in record numbers, the uncataloged backlog in Park Service museum collections includes approximately 22 million objects.

To integrate cultural and natural resources in a broad ecosystems framework for management and interpretation, the scope of cultural resources must be expanded

from a narrow focus on historic preservation to a broader focus on cultural conservation. The latter aims to protect living cultural traditions, and cultural knowledge that represents the diverse American heritage. To respond to concerns articulated in the American Indian Religious Freedom Act of 1978, the 1980 amendments to the Historic Preservation Act, and special provisions for Native American use of resources in the Alaskan parks, the Park Service needs a much-expanded capacity for ethnographic research and additional attention to facilitating harmonious relationships among park managers and diverse neighboring populations.

While the National Park Service has focused its limited capacity for ethnographic research on Native American issues of pressing concern, ethnographic research is needed wherever different cultural groups have long-standing associations with park resources. Neighboring communities also have concerns that must be addressed in park planning as they transcend park boundaries.

Ecosystem management also entails a greatly expanded role for social science and social ecology research in the national parks. This research should include assessments of socio-economic costs and benefits of proposed management decisions. It should clarify the interactions of parks and neighboring communities to assist in developing cooperative resource management plans, to determine how parks affect local and regional economic development, and vice versa. Visitors are also a critical component of park ecosystems. It is essential to know who they are, how they behave in and respond to parks, and what their preferences are. Assessing visitor carrying capacity, and visitor impact management, must be based on scientific knowledge.

Social science research will have a special role to play in evaluating how well national parks meet the expanded education and outreach goals envisioned in this report. This research should provide basic data on special segments of the population such as minorities, international visitors, handicapped persons, and the poor. Research results can be used to improve educational and outreach programs for intended audiences.

Research provides more than the knowledge required to support National Park System management decisions and goals; it is also an output of the system. Natural, cultural, and social research enhance basic knowledge and help to solve problems outside the system itself. The National Park Service's urgent need for research-based information is a magnificent opportunity to work in conjunction with other government agencies, private institutions and groups. Recently there has been progress. Some parks and regions have published "research opportunity" booklets to disseminate park needs. Some parks benefit from formal relationships with Cooperative Park Studies Units (CPSUs) based at universities. Shenandoah and Mammoth Cave are two parks that enjoy excellent collaborative programs. Systemwide, however, the number of CPSUs has actually declined in recent years, and there is a paucity of CPSUs devoted to cultural resource management concerns. Until National Park Service-sponsored and supported research fulfills the goals on a much greater scale, the agency will not be meeting its own needs or achieving its potential contribution to America and the world.

We see an urgent need for a formal congressional mandate for a National Park Service research mission. This mandate would enable the National Park Service to establish a distinct and credible research organization. The information obtained through research on the status and conservation of natural, cultural, and recreational resources can support park management programs and help inform larger social and environmental policies. Support for research activities should be commensurate with the challenge and should be funded at a level equivalent to that of other resource agencies.

Professionalization

Parks must be managed in a much more professional manner. To implement ecosystem management and achieve educational goals, appropriate characteristics must be identified and sought in selecting, educating, and promoting future park managers. Major skills qualifying National Park Service professionals should include (1) knowledge of and ability to apply ecosystem management, (2) the ability to solve problems and pursue opportunities, (3) skill in using research-based information to interpret cultural and natural change to a broad group of clients, and (4) the ability to represent natural and cultural resource interests professionally in an environment that will be increasingly political regarding land use issues. These are some of the positive qualities we found among dedicated park professionals, and are common features that we desire to see present throughout the Service.

Any program to improve research and resource management must consider upgrading the professional qualifications and abilities of all employees of the National Park Service. At the same time, such improvement may mean utilizing the services of professionals in new disciplines. Again, parks' invaluable resources must be managed by people who can analyze and understand them if the resources are to be maintained.

Professionalization is the means to ensure that both internal and external factors keep managers accountable for protecting the resources and serving the public. These factors include systematic and continuing

research, university curricula and education to ensure disciplined knowledge, peer review, and participation in professional organizations. For example, for both in-house and contractual research and management projects, the National Park Service should implement peer review mechanisms that draw on the best qualities of similar arrangements utilized by the National Academy of Sciences and the National Endowment for the Humanities.

One major difficulty that must be faced is the need for increasing specialization within resource management. The generalist ranger, who must both serve the visitor and manage the resources, does not always have the specialized education and training to meet the complicated needs of today's parks. Yet most jobs within the National Park Service are filled by generalists, selected from a job series classified as nonprofessional by the federal Office of Personal Management.

While the Park Service will never outgrow its need for a mix of generalists and specialists, the system can no longer rely on the existing arrangements. Parks now require stewards skilled in such diverse areas as barrier reefs, museum curation, exotic animals and plants, caves, insects, wildlife populations, local zoning laws, Native American subsistence activities, water rights, marine mammals, ethnology, and industrial history, in addition to traditional subjects related to law enforcement and visitor services.

It is especially important that resource management specialists, who organize and supervise many aspects of park stewardship programs, hold graduate degrees in fields related to their duties. In this increasingly specialized work, they need the ability and experience to anticipate research needs, integrate diverse sources of data, justify management actions for cultural and natural resources both scientifically and legally, and keep abreast of new strategies.

Park and recreation programs exist at various universities. However, none of these has been specifically directed toward producing professional park rangers or other types of managers for the National Park System. The National Park Service has a rare opportunity to work cooperatively with universities, associations, and others in designing curricula and degree programs. Improved training programs within the National Park Service, and the initiation of a resource management specialist training program in 1982 have helped somewhat, but they are inadequate to serve the long-term needs of the system.

Education

Education is the great unifier of the National Park System. Public resources will not be preserved unless we are committed, as a nation, to their preservation. The resources and the values they represent are inextricably linked. Education is the chain that may bind disparate elements together over the next century, enabling the National Park Service to resist pressures for instant gratification. An enduring element for all areas of the National Park System is the role and responsibility of the Service to provide all people with the information and inspiration necessary to appreciate the resources of the system and the greater environment.

The adoption of a broader education mission will have strong implications for research and resource management in the National Park System. Each park, and the system as a whole, must develop education goals in coordination with preservation and visitation goals. These should be ambitious and will often be difficult to achieve. For example, the full range of our cultural heritage should be presented and interpreted. The history of slavery and the oppression of Native Americans should receive as much research and honest interpretation as the more attractive elements of our nation's past. Only truth can make us free to achieve unity of purpose in America's pluralistic democracy. Similarly, management decisions for natural resources should allow opportunities to see a wide range of ecosystems. To portray the diversity and function of ecosystems will require vigorous management and restoration efforts, for example, to reintroduce top predators. The goal of all management should be to provide as full a range of educational experiences as is compatible with the preservation of resources. The future of the National Park System, and of the world, depends on the understanding such education engenders.

The world is rapidly changing as human populations grow and as our activities exert ever-increasing impacts on our global environment. Choices we make today about the care of our cultural and natural resources will greatly affect the quality of our lives in the future. With its diverse resources, the National Park System is uniquely equipped to prepare all sectors of the public to make informed choices.

The National Park System includes unexcelled examples of the contrasts between the present and the past, and among types of human impacts on widely different environments. Parks can dramatically demonstrate the consequences of management decisions that respond to or initiate the changes. Thus, the National Park System is a collection of diverse classrooms in which people can observe environmental and cultural dynamics.

The National Park Service has a commitment to educating the public about its unique natural, cultural, and recreational resources. It is present in park interpretive programs. The Service has also recently launched new initiatives to expand the power of parks to educate. Annual systemwide interpretive initiatives have been structured to present issues such as air quality and biological diversity to park visitors. Other progressive steps include the Service's exemplary wolf education project, coordination with efforts such as Black Heritage Month, and the participation of the Western regional office in undertaking the design of a conservation education program for the Hawaiian islands. National recreation areas in urban settings have taken advantage—but not full advantage—of opportunities to extend the national park message. Yet, despite such progress, the Park Service commitment to education must be strengthened even further. A new beginning is now in order.

Educational and interpretive programs must be extended to urban, suburban, and rural people with equal effectiveness. Expanded cooperation with elementary and secondary schools beyond park boundaries, as well as with field schools and research centers affiliated with the National Park System will help accomplish this outreach objective. So will coordination with urban park programs and their associated local and regional outreach programs. The educational programs at Everglades National Park and the successful cooperative efforts between the Service and the U.S. Geological Survey at Hawaii Volcanoes National Park are laudable examples. Ultimately, cooperation in education should be international in scope. Special efforts should be made to increase outreach to black, hispanic, and other minority or disadvantaged Americans who historically have had less access to the National Park System. Outreach and extension of the National Park System have the ultimate goal of increasing national unity through a common understanding of our environment and the role it plays in all our lives.

RECOMMENDATIONS

These recommendations are based on the fact that pressures from human populations and relentlessly changing environments now threaten the parks' abilities to serve their vital functions as oases for life and spirit. Decisive action is now needed as never before. Although listed separately below, these recommendations are essential parts of a whole.

Ecosystem Management

To implement management policies for the long-term stewardship of the system, the National Park Service should take several general steps:

1. Install and refine the concepts of ecological management. The process of management should involve a variety of problem-identification and problem-solving tasks:

a. establishing preservation and visitor impact management goals

b. defining ecosystem boundaries

c. involving other owners within and near the boundaries in goal-setting and management decisions

d. establishing an integrated inventory and monitoring program using state-of-the-art statistical and geographic information system techniques

e. agreeing on criteria for achievement

f. integrating the science base of management with management activities

g. periodically reviewing progress toward goal achievement and modifying management techniques based on accurate data.

2. Provide access to the scientific, scholarly and user communities through establishing national, regional, and park Ecosystem Management Advisory Panels.

3. Cooperate with other federal agencies on the development of an Ecosystem Management Network, through which new information on techniques and results can be exchanged quickly. Ultimately this network should be international in scope.

4. Significantly strengthen cooperation with educational institutions to provide an ecosystem management training and education program for rangers, resource managers, and superintendents across the entire spectrum of cultural and natural resources.

Research

To support research in the parks, Congress should take the following action:

1. Provide a formal mission for a Park Service research program and support it through identified budget line items so that this effort represents at least 10 percent of the National Park Service's operating budget.

In establishing this research program, the National Park Service should ensure several program features:

2. Responsiveness to the immediate needs of Park Service properties and programs through mechanisms for a strong, cooperative relationship between managers and investigators in developing priorities, allocating resources, and transferring information.

3. Primary emphasis on research needed to support identifiable management options. However, a significant fiscal component, 35 percent, must be autonomous from line management to ensure an independent and credible professional program and the necessary intellectual freedom of investigators to pursue and report on research topics.

4. A focus on diverse scales, including the larger spatial scales of ecosystems and landscapes, and longer time periods, and one that recognizes greater cultural diversity.

a. Immediate attention and rapid progress is needed on research programs to provide basic understanding of the processes that drive park ecosystems and the interactions among natural and cultural resources. This research should include the selection of a small set (6 to 10) of natural ecosystems for establishment of a program comparable to the Long Term Ecological Monitoring sites supported by the National Science Foundation, and should make maximum use of NPS-based Biosphere Reserves and other international intiatives.

b. All research cannot be site-specific; some must place events, sites, and processes within the broad patterns of American history.

c. Ethnographic research must be expanded to permit the National Park Service to meet the challenge of cultural preservation policies and directives and to cooperate more effectively with culturally diverse neighbor populations.

d. The social science program must be staffed and funded so that it can provide needed data on socioeconomic impacts of management decisions, park visitors, and the effectiveness of education and outreach programs.

e. Ongoing research is needed to develop the best procedures for conserving artifacts, preserving historic structures, and meeting new challenges, such as preserving America's industrial heritage. The National Park Service should be the nation's leader in developing these techniques.

f. NPS should create and implement mechanisms for collaborative research among parks, with other reserves, and with other agencies and organizations that also conduct research on natural, historical, and cultural systems.

5. Establish a significant non-Park Service, or contractural component of the National Park Service research program to ensure flexibility, availability of the best specialized expertise to address specific problems, and regular independent assessments and fresh perspectives.

6. Peer review during planning, execution, and reporting of the National Park Service research, which is essential to ensure the high quality and credibility of the program, including extensive use of outside expertise.

7. New zones for research, within the existing National Park Service land classification system, established at appropriate sites in individual park units as a part of the unit's planning. Appropriate research should be encouraged in these zones in accordance with established guidelines.

8. Immediate and active participation in the development of research plans by the Interagency Committee on Earth Sciences and the National Academy of Sciences' Committee on Global Change. NPS should offer qualified units of the National Park System for obtaining baseline data to study changes in the biosphere.

Professionalization

The National Park Service must take several major steps to achieve professionalization:

1. Provide effective and professional interpretation and resource management. The Service must provide strong professional guidance and career ladders for interpreters and resource managers at park, regional, and national levels. Scientists, resource managers, historians, and other professionals should have training assignments and access to career management jobs. In some cases, this strategy may require looking to disciplines other than those traditionally considered appropriate to National Park Service activities.

2. Hire regional historians, anthropologists, biologists, and social scientists with PhDs or the equivalent, who can retain close ties to Cooperative Park Studies Units

and other research institutions, and who will undergo periodic research-grade evaluations. Researchers working under these individuals, including contract employees, should have appropriate graduate credentials. The National Park Service must support the publication of research and participation in scholarly activities essential for professional development.

3. Develop the ranger series (025) as a professional series, requiring a minimum of a bachelor's degree, with a GS 7 entry level. The intent should be to create a cadre of resource managers who are literate in the fields of natural and cultural resources and who can think critically and analytically.

4. Provide for research and management efforts coordinated by resource management specialists in conjunction with Cooperative Park Studies Units or other research institutions under the guidance of professionals. The Service should hire people with at least a master's degree (or equivalent) as resource management specialists and should require them to publish results and to meet with their peers on a regular basis for professional development.

5. A system of accountability for managing and protecting natural and cultural resources should be implemented at all levels of management.

Education

The President should propose and the Congress should support the following:

1. A greatly increased educational program for the National Park Service.

The National Park Service should take a number of steps to meet its charge in education:

2. Design interpretive programs that capitalize on the vital relationship between public enjoyment and park resources. Such programs should also recognize that knowledge about our natural and cultural environments helps us protect our quality of life in the face of the challenges of global change. The demands of preservation, restoration, and use, and the important biological, economic, and social costs of enlightened park management should be fully understood and explained to visitors, using the ecosystem concept.

3. Interpret research and resource management policies in each National Park System unit, explaining to visitors the philosophy underlying park research and management, the reasons for the policies, and their visible impacts.

4. Develop systematic coordination with elementary and secondary educational institutions beyond park boundaries, using park resources to teach a conservation ethic to young Americans, focusing on cultural and ecological change.

5. Emphasize bringing to the public information about ecosystems and their cultural and natural components. Such education should stress the impact of human activities on our local and global environments, and the effects of the environment on human activities.

6. Launch long-range programs to bring such information to a wide audience, using mass communications and advanced technology to export interpretive programs to audiences outside park boundaries and to allow diverse populations to benefit from the lessons of each park.

7. Take a leadership role in promoting international education on global cultural and ecological changes, recognizing that such education may prove vital to the future of the world.

CONCLUSION

The National Park System is threatened by many things, but by none more than ignorance and inattention by the American people. Its basic values must be sustained and its resources conserved. Old and new concepts and tools are available to accomplish these tasks. We must move vigorously and quickly, applying the best concepts and tools available, if we are to save the National Park System for future generations.

If the National Park Service is to succeed in its historic and evolving responsibilities to preserve natural and cultural diversity, it needs to take its leadership and educational roles seriously. This, we believe, will require an evolution, some would say a revolution, in the way the Service manages its research, resource management, and interpretation activities.

Some dedicated park professionals have helped lead the National Park Service away from its passive custodian past into a progressive future in which resource management policies aim to match the lofty goals of these visionaries. Some of our recommendations agree with recently finalized statements of official management policies for the National Park Service. Our hope is that this report will strengthen these policies, and advance them even further. The crisis that has developed over the past 25 years has not been due solely to an absence of philosophical and managerial guideposts. Rather, it has stemmed chiefly from failed and uneven implementation. The need now is to put new visions into practice.

Because of our National Park System's value, both nationally and internationally, and its sensitivity to environmental threats, the National Park Service has a profound responsibility for protecting these treasures. As we begin to comprehend the interconnectedness of our environment, we realize that if our parks are damaged, so are we. It is now time to act—not just for our parks, but for us—all of us.