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Scientific Values of Public Parks

The fit between public parks and scientific research is in some ways an obvious one. Many national, state, and regional parks were set aside, at least in part, to protect natural or historic objects of significant interest and value to society. Those same objects, whether they be a prehistoric kitchen midden or a vast natural ecosystem, are likewise attractive to the scientific community. Secondly, compared with other potential sites for field research, parks are relatively unperturbed by confounding variables. That is, those "objects of interest" have likely been less modified by intervening human activity: A tree in the forest probably got there through the actions of the local biotic community, and not because some helpful human planted it. Or if it was intentionally planted—say as part of an orchard during an earlier point in its history—the particulars of that plantation are likely recorded somewhere. This factor also makes parks invaluable reference points for comparison with the ever more extensive altered landscapes that have been converted to human utility. The tacit promise that the elements that parks seek to preserve will persist, or at least evolve through the ordinary processes of nature, makes parks and preserves especially attractive to the increasing numbers of scientists interested in long-term research. And lastly, parks are designated for public use: Scientists as part of that public may have a reasonable expectation of accommodation so long as their activities do not compromise park values.

Equally obvious on its face is the notion that a thorough knowledge and understanding of a park's resources are essential to its long-term preservation and welfare. The primary mechanism for the generation of such knowledge is scientific research. Moreover, the principles of science likewise inform park management, so that the outcomes of management actions are predicted in advance with some associated measure of reliability, and unintended consequences are minimized. As Sellars (1997, Chapter 3) documented so cogently, management for perceived publicly desirable or useful outcomes was the order of the day in the American National Park System until the 1940s. Those outcomes included such activities as reductions of predators and other "vermin" to increase herds of ungulates; manipulations of forest structure through removals and plantings, and vigilant fire suppression to increase vigor (in the forestry sense); "scene management" to mold parks toward accepted norms of landscape beauty; and provision of what were thought to be more entertaining experiences for visitors through such devices as wildlife feeding shows. By the 1960s, however, an increasing appreciation for untrammeled nature, warts and all, and greater scientific understanding of ecology and the important roles of predators, tree snags and logs, and even native pathogens, for example, led to a growing "hands-off" respect for the work of natural processes and humility regarding the ability of humans to improve upon nature's handiwork. This was particularly notable in passage of the Wilderness Act in 1964, and the subsequent addition of many American national parks to the National Wilderness System. Neither the sentiment for intervention, nor the subsequent belief that nature knew best, was particularly well informed by formal research or monitoring to see if the system was behaving as predicted.

It is ironic, and in some ways quite sad, that the belief that parks could be preserved intact for future generations simply by "letting nature take its course" survived only about one generation's tenure in the park management business. Its inevitable demise was occasioned by the convergence of several factors. Among them are the juggernauts of population growth and development that have increasingly turned parks and preserves into isolated fragments of once-ubiquitous ecosystems, and the increasingly pervasive influence of anthropogenic stressors such as air pollution, climate change, and the global transport of pests, pathogens, and weeds. Concurrently has come the unraveling of the ecological paradigm of "the balance of nature" and the traditional assumption that intact ecosystems are fundamentally homeostatic. Within the halls of academe this has been replaced with a new appreciation for the dynamism of ecosystems and the powerful role that catastrophic events—droughts, floods, fires, volcanic eruptions, as well as long-term cycles, such as climate—play in periodically toppling the ecosystem applecart and even pointing it in new directions. Thirdly, the timely maturation of the natural sciences—ecology in particular—to the point where they have predictive power has radically increased their importance to park management during this time of accelerating planetary change. To a great extent, of course, scientific principles and knowledge of the biology of particular organisms or their ecosystems can be generated by research conducted outside parks. However, this ability to generalize remains quite limited, unfortunately, so that to a great extent predictive power is achieved only from information collected on site. Consequently, on-site research is more important to parks than it has ever been, and has not infrequently been directly connected to their preservation (Davis and Halvorson 1996).

It is increasingly true that parks and equivalent reserves provide the best—and not uncommonly the only—examples of unimpaired ecosystem elements such as wild rivers, uncut forests, untilled lowlands, and unroaded uplands. Although parks have become greatly altered nearly everywhere, natural catastrophic events such as fire and flood more frequently are permitted to play out there than elsewhere; hence the increasingly important research on how ecosystems reset after such events may require parks. Although examples of rare plant and animal populations are now protected through a myriad variety of government and private management arrangements, parks typically offer the critical wild ecosystem context for rare species so important for many scientific studies, especially those involving ecology, that may be necessary to restore and sustain these species elsewhere in the wild.

A scientific objection to the use of parks for scientific research has occasionally been the intervening effects of park visitors. Without doubt, there are popular sites, such as Yellowstone's Old Faithful or Yosemite Valley, where the crush of humanity itself, as well as the infrastructure created to support it, are pervasive ecosystem influences. For the most part, however, and especially in the larger natural parks, visitors are highly localized and seasonal. Because they are generally forbidden to harass or hunt wildlife (with, in the U.S., the notable and bizarre exception of fish) or remove native materials (with the equally notable and bizarre exception of many plant foods for local personal consumption), in fact park visitors do not generally represent a perturbing influence on studies of wild ecosystems. As a consequence, closing park areas while scientific studies are underway is generally unnecessary.

Parks with interpretive educational programs benefit greatly from park-based scientific research. Park visitors, finding themselves in unfamiliar surroundings, are themselves on voyages of discovery: They are open to new possibilities. There is a freshness and immediacy to communicating the latest findings about this place in which they find themselves directly to park visitors. New discoveries—perhaps fresh from the previous field season and not yet published—may be provided to park educators by enthusiastic investigators. Sometimes scientists or their technicians make themselves available for public presentations, or may be persuaded to translate what they've been doing into understandable vernacular accounts. Also of great value is the presence of the scientific activity itself. Encountering wildlife fitted with ear tags or radio transmitters, discovering tagged trees, stream gauges, soil lysimeters, or remote weather stations with satellite uplinks, or perhaps meeting a scientific team itself engaged in excavating an ancient village site or coring trees to determine their age, is generally a highly positive, stimulating, and educational experience for park visitors. It renders the abstractions of science real to a public that has little direct experience with either the practice of science or its practitioners, and helps make the connection between research and the conservation of a well-loved place.

The fit between parks and scientific research may be greatest in the relatively new arena of long-term ecological research and monitoring. Traditional research, in national parks and elsewhere, was designed to fit well within a period of a few years—the typical amount of time allotted to a graduate student's research and (not coincidentally) the usual duration of a funding grant. The accelerating urgency of understanding the change taking place all over our planet, and an increasing need to place that change in the context of ecological time scales (decades to millennia) and evolutionary time scales (millennia to millions of years) has moved long-term research and monitoring to the forefront of conservation biology as well as to that of parks' perceived needs for scientific information. The National Park Service has developed, and is now funding, an ambitious monitoring program intended to provide not only a more rational basis for park management, but to inform the larger society how and how quickly its world is changing (Davis 1993). Closely allied to this interest in long-term research is a newly rediscovered enthusiasm for cataloguing the earth's biological diversity before much more of it is lost (e.g., Wilson 2002). A so-called all-taxa inventory has been initiated in the Great Smoky Mountains National Park by a large consortium of public and private, scientific and lay organizations. In 2000, the All Species Foundation was established and dedicated to enlarging this effort to the entire planet. No doubt, many of their first efforts will occur in parks and preserves.

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