Integrating Science and Management: Becoming Who We Thought We Were

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ANYONE WHO SPENDS TIME IMPLEMENTING THE NATIONAL PARK SERVICE'S ORGANIC ACT becomes impressed with its inherent technical challenges. If we are to keep parks unimpaired, we will have to understand large-scale issues, such as fragmentation of landscapes surrounding parks, the high-stakes losses that invasive plants and animals promise, the decline in migratory species, and the all-pervasive implications of global climate change, in sufficient detail to manage them. While intuitive decision-making may have sufficed in the 20th century, it certainly will not ensure that the natural systems (the "wild life and scenery") of national parks will be maintained throughout the 21st century. In that sense, the Organic Act drives us toward mastery of natural systems science, toward understanding, and toward action. We have no choice.

Meeting that challenge requires that a lot more information be generated, synthesized, and applied in parks. It is not enough to conduct issue-driven science in our national parks; we must find better ways of incorporating a broad, science-based understanding of the dynamics of our resources into our planning, decisions, actions, and messages.

Though much of that may seem clear today, National Park Service managers were roundly criticized in the latter third of the 20th century for viewing science "with anything from benign neglect to outright hostility" (Kaiser 2000). The National Park System Advisory Board, in its 2001 report *Rethinking the National Parks for the 21st Century*, noted: "Debate over the lack of science-based resource management continued [since the publication of the Leopold Report in 1963], but the Park Service made little progress during the last three decades in acquiring solid knowledge about park resources. Though criticism for this omission has mounted, science still takes a back seat in the parks."

The lack of progress noted by the Advisory Board in 2001 was symptomatic of a larger reality: for most of its history, the NPS has suffered from a predictable schism of dealing with the comfortable and familiar realm of visitor services (to satisfy the public and Congress) versus investing in science and scientists to deal with looming, large-scale, impairment-level resource threats. For decades, the need for science in park management was more a source of denial than an accepted truth. In the past, we appeared to be doing better than we actually were—an endemic problem in an agency whose spectacular resources can hardly help but make their managers look good. In short, we were wearing the white hat—but there was something missing

underneath. There existed a monumental gap between what the NPS thought it was, and what it had to do to become what it needed (needs) to be.

Toward the end of the 20th century, the need for science to underpin management—and the lack of it—was becoming achingly clear. The National Environmental Policy Act (NEPA), and the public at large, demanded greater accountability from NPS decision-makers. Full disclosure of proposed action alternatives, and the environmental consequences thereof, often tended to expose how much we didn't know. Significant court decisions faulted the agency for failing to base its actions in sound science. But ambivalence remained, in part because science was not originally built into the culture of the agency, and also because of a lingering sense that natural systems only had to be within a park boundary to be protected, or were so complex as to be unknowable, anyway.

So, what do we have to do? I recently heard of visitors from Germany observing that we treat environmental compliance like the icing on a cake, while they treat it as part of the batter. I think that analogy also applies to science in parks. The Natural Resource Challenge may be a turning point towards operational integration of science throughout the organization. At least I hope so.

Quite possibly, a change in attitudes among upper management began to crystallize with the publication of *Preserving Nature in the National Parks* (Sellars 1997.) In fact, a number of factors aligned to produce the group effort that became the Natural Resource Challenge. Funded by Congress since 2000, the Natural Resource Challenge brings science (resource inventories, monitoring, and applied research) and many science-trained personnel back into 271 natural resource parks. It provided the NPS with a vision and strategy, built around several on-going and some new initiatives, to improve the integration of science, park planning, and management. The goal was to revitalize and expand the natural resource program within the Park Service and improve park management through greater reliance on scientific knowledge. The Natural Resource Challenge was, and is, a challenge to everyone in NPS—not just a few—to use science, to depend on it in decision-making, and to make it an unquestionable part of park operations. The Natural Resource Challenge is our statement and a commitment that we will prepare to meet an uncertain future head on.

But ecological monitoring data and research reports do not, in themselves, improve stewardship of park natural resources. Scientific information must be accessible and integrated into planning, environmental compliance, interpretation, and resource management. Based on the experience of the NPS and similar efforts by other agencies, this incorporation of new information may be the most daunting and important step.

Historically, one hurdle in the path of integrating science and park management has been that the science produced by researchers in national parks is not always immediately relevant to current management needs. As such, finding relevant science often has been an opportunistic process for managers, in which their information needs are fulfilled—or not—based on what happens to be available. Or if funding can be found, the results appear several years down the road, often after decisions have been made. For those who hope that their science may result in an improved

national park system, this disconnect isn't optimal either, as it relegates a wealth of otherwise useful scientific information to a shelf in a manager's office.

The real answer, in my opinion, lies in a fundamental change in our approach to and attitudes toward science in parks. First, we must transform parks into true laboratories—vibrant hubs of discovery. If parks become the first choice among potential research sites for a broad spectrum of field scientists, a wealth of information can be accumulated. Very little may be of immediate use, but each park that invests in the role of research venue as a larger, legitimate part of park operations will become information-rich.

However, parks must then take a second, critical step. Parks also must invest in the long-term presence of systems modelers and integrators, whose job it is will be to assemble the accumulating wealth of data into functional models that identify structure, quantify relationships, and eventually allow predictions. Constant refinement of these models over time will evolve into a broad understanding of the complexity of park resources—fortifying the NPS's position as the credible authority on NPS resources. When this happens—and there are examples of parks where it has—parks becomes the decisive voice for park protection in all the important arenas (public, legal, congressional, media). Combined with an effective education program, parks can influence not only park issues but also larger quality-of-life issues in their surrounding communities and contribute significantly to the environmental health of the nation. This was the underpinning concept for the Research Learning Center Network, which has not yet been developed to its potential. This investment by parks would truly represent a major shift in how managers approach protecting parks.

Both managers and scientists must shift how they see themselves and each other, as well. First, they must recognize they are partners, for only in an environment where scientists and managers share a common vision of the outcomes of their respective efforts can we truly expect an effective integration of science and management. To those ends, the National Park Service can:

- Meet the needs of park visitors, but also invest heavily in becoming the world's authority on park resources.
- Encourage academics (and their funding organizations) to see parks as places to do work and to see their research incorporated in usable knowledge that is used directly for the public good.
- Train managers to move toward a true integration of science and management by developing personnel who are long-term, on-site authorities on park resources.
- Establish processes that enable managers and scientists to interact and communicate in ways that meets the needs of park managers and preserve the independence and integrity of its scientists.

A workable analogy might be an operational protocol that gives to a senior park ecologist or science advisor the same deference that is traditionally given to a trusted solicitor. This is vital if one accepts that each bad environmental decision has an accumulating impact perhaps at least equal to legally problematic ones. If we are serious about maintaining the quality of a national park experience, we must minimize our error rate.

In sum, the future for national parks will be bright if parks are seen by the scientific community as optimal research sites. At the same time, the future can only be bright if we have a full and serviceable understanding of complex park resources. We must choose new priorities in operational funding and in mission-relevant organizational principles. We must not guard our past practices; we must guard the long-term viability of parks. Otherwise, we will gradually lose the wild, authentic qualities of our parks as the cumulative result of unreliable decision-making. We must do whatever it takes to achieve the outcome intended by the Organic Act. That includes mastery of natural systems science and its application. We can become the agency we thought we were, and always wanted to be.

References

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