

VIEWS ON NATURAL SCIENCE AND  
RESOURCE MANAGEMENT IN THE WESTERN REGION

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## VIEWS ON NATURAL SCIENCE AND RESOURCE MANAGEMENT IN THE WESTERN REGION

During our first century of managing national parks, we took it upon ourselves to "play God"--because we decided which natural processes were "good" and which were "bad." But how did we assign such moral qualities to fire in the forest or to predators among species of wildlife?

In 1963, we were reminded by the Leopold Report that "playing God" was not what our mission is all about. And as scientists or managers, I find it useful from time to time to look at some of its major points again. You remember the catch phrases: "National parks should be a vignette of primitive America," and "A reasonable illusion of primitive America can be recreated . . . using the utmost in skill, judgment, . . . and ecologic sensitivity."

But there were other important ideas too:

1. It pointed out the folly of tinkering with natural processes, without understanding these processes.
2. It said that the NPS must recognize the enormous complexity of ecologic communities and the diversity of management procedures required to perpetuate them.
3. It said that management without knowledge would be a dangerous policy.

When I began my present assignment in the Western Region, I wrote a memo to my boss, Howard Chapman, in which I raised several basic questions about science and scientists and attitudes of managers toward them. I said that perhaps the first question we must ask ourselves and answer honestly is: "Do we really want professionals and scientists in the National Park Service?" If we do, we must pay for this service, both through adequate funding and through strong commitment to the highest standards of professional activity. Such activity must include:

(1) high-quality, in-house research to provide essential facts to guide management programs; and

(2) publication of these results in professional journals.

Our past performance, while it has been improving recently, still has a long way to go, as both the Robbins and Leopold Reports in 1963 pointed out. In summary, these reports said four things:

(1) We need a permanent, independent, identifiable research unit within the Park Service.

(2) Most of the research by the Park Service should be mission-oriented.

(3) The NPS should itself plan and administer its own mission-oriented research program.

(4) The results of research undertaken by the Park Service should be publishable and should be published.

Such concepts form the basis for my personal philosophy of what our objectives and goals ought to be for a natural science research organization in the Park Service. But I think there are differences in approaches between some managers and researchers on these points.

#### THE MANAGER NEEDS THE SOUND, SCIENTIFIC SUPPORT OF THE SCIENTIST:

While many managers may sense they need information upon which to base their management of forest resources or wildlife resources or fisheries resources, they don't always think they need a real scientist.

"Just get me the data," some say. "Give it to me in a report with management recommendations I can understand. But don't bother to write it up for those ivory-tower scientific journals. That's just the scientist doing his thing with his scientific peers. That's for his own personal benefit. It doesn't help me."

I want to say that I strongly disagree with this philosophy. And I want to tell you why. There is no way that you, as a manager of natural resources, can be assured your scientist's information is solid unless he operates like a scientist and is recognized by his peers and the scientific community as a scientist. And for this to happen, there are few viable shortcuts to the process of careful

design of a research project, careful review of that design by the most knowledgeable professional peers, careful gathering of data (often by research technicians, not the scientist himself), and professional analysis of the results and drawing of conclusions which are then subjected to several review processes:

(1) Preparation of a draft paper which describes methods, results, and conclusions, and then review of that paper by the best possible professional peers wherever they are in the world.

(2) A second review of the data and conclusions takes place as your scientist presents a paper at his professional society's annual meeting, which both brings constructive criticism from knowledgeable scientists and alerts the scientific world that your scientist is working on a given project and, thus, puts him in touch with others doing similar work to share ideas and avoid duplication.

(3) Finally, the acid test is publication of the methods, results, and conclusions in the appropriate scientific journal, a process which brings to bear highly critical review of the approach used and the validity of what your scientist is saying.

Sure, there are shortcuts to this process. But taking them leaves you vulnerable. You will never be sure when challenged in a public meeting (as most controversial resources management decisions these days will be) or when challenged in court, and many decisions are going that route too (witness Grand Canyon burro reduction proposals and Grand Canyon River Running Management Plans as examples), you will never be sure that you have your act in order unless you have done your scientific homework. And to that, there is no shortcut.

To get this quality work done, you need top-quality scientists. This in no way negates the extremely important role of management biologists or resource management specialists, but let's not mix these two roles. I'll have more to say on resource management specialists later, but first, with appropriate credits to Dr. Bill Robertson of Everglades, here's what I feel about the professional abilities, activities, and standing of NPS research scientists:

### Characteristics of a Scientist

Good science requires the unwavering search for truth. In turn, this requires high standards of honesty, accuracy, and integrity. A creative scientist will also display imagination, initiative, and drive as he attacks the problems of prime importance to him and his employer. If he also has some measure of wisdom and judgment, he may have the opportunity to become a major contributor to the society of which he is a part. All of these qualities are required to

produce a solid research product--a publication--which will be of value to the Park Service manager and to the scientific community.

Normally these characteristics are part of the personality of a person who decides on science as a career. The usual pattern involves both undergraduate and graduate education and training in the sciences, including independent research leading to a thesis or dissertation. This independent graduate project demonstrates some measure of competence in applying the scientific method to solving a problem. Publication is the final product.

### Professional Activities and Publications

There is a point of view that the research arm of the Park Service doesn't have to live by the "publish or perish" philosophy of the university community. When I hear this comment, I am reminded of the 1968 statement by then Chief Scientist Leopold who noted that, "The success of our research endeavors will be judged on three principal bases:

- (1) the scientific quality of the product;
- (2) the acceptance and use of our knowledge by Superintendents; and
- (3) the development of an ecological management program by parks and the surrounding landowners jointly."

Leopold then drove home his first point on scientific quality with a statement that may make some managers and scientists uncomfortable, but it's a point that I agree with completely, and one that I think is extremely important:

"The simplest and surest measure of research quality is publication. All major investigations undertaken [by the Park Service] should be designed and pursued with ultimate formal publication in mind. Half-baked studies, suitable for rough guidance of management but not publishable, will not suffice for our primary projects. There is nothing precious or God-given about the printing press, but the fact remains that many Government agencies indulge heavily in mimeograph research reports which are not good enough to cut much of a figure in the scientific community. The age-old university maxim of "publish or perish" should apply to any serious research organization, including our own."

This is a point I have trouble with in discussions with many managers and some researchers. Yet, I feel strongly that if a field research scientist doesn't publish, the research mission of the Park Service will certainly perish in the sense that it will come to have zero influence in or out of the Service. Attendance at important professional meetings to present papers describing results of on-going research is an important phase of the job of a scientist. His only more important product is publication in technical and professional journals.

### Professional Standing of the Scientist

The reason I'm giving so much emphasis to this matter of publication is that the Park Service must encourage its scientists and other professionals to become respected members of the scientific and professional community. Until we do, we'll only be able to attract and keep within our ranks the less able and the less ambitious. And when it's necessary for managers within the Service to refer to our own scientists' research, we will find that the opinions of our scientists carry very little weight, unless those scientists become established in their profession. So, when Don Field publishes in the professional sociological and leisure research journals, describing results of studies undertaken to solve management problems for the Park Service, he's not only doing what he must do as a scientist, he's doing what is essential in his role as a representative of the National Park Service's scientific organization. And managers will benefit from the fact that Dr. Donald Field is known and respected in the community of sociological researchers. And when some action you want to take depends on recommendations of Dr. Don Field, including the inevitable challenges to our actions in courts today, Don's standing in the scientific community may be very critical.

So, what I am saying is the NPS must increasingly learn to support their local scientist and their local Cooperative National Park Resources Studies Unit (CPSU) when they seek to establish a reputation for solid scientific achievement. We must learn to support the process of presenting papers at scientific meetings and preparing the results for publication in the best possible scientific journal.

### ATTITUDE OF THE NPS SCIENTIST

On the other hand, let me warn the NPS field-area scientist and the NPS CPSU scientist that a part of the reason we lack management support for science stems from attitudes of some NPS scientists and research biologists. There are those scientists--few, I hope--who are inclined to use fancy equipment and procedures to do a job that less sophisticated procedures could do equally well and with better

management support and understanding. If you need computers and sophisticated equipment, use them. But don't play science games. And don't try snow jobs on managers.

Because the NPS scientist who does not fully understand that the primary function of NPS scientists is to produce mission-oriented results for those problems identified by NPS management as being top priority problems has done great damage to the image of science in the NPS. Such an individual may feel he's free to study whatever strikes his fancy, because anything he learns will benefit society and hence the NPS. While most basic research has some interpretive value, there's no quicker way to lose support of the hard-pressed manager with a tight budget and an early deadline than to operate this way.

The manager often feels he can't wait five years and spend \$100,000 to get the answer he needs to make a decision. On many issues, he needs (and should get) at least general guidance in making early decisions, with a reasonable minimum-dollar support of the research effort. Here, obviously, is a built-in conflict, even with scientists who understand the mission-oriented needs of NPS science and the priority dollar crunch under which we all must operate.

But we can make it over this hump if we have two things:

(1) greater understanding on the part of the manager that good solid science is costly and takes some optimum minimum time, and that following through to publication is a worthwhile investment both for the scientist and the manager.

(2) greater commitment on the part of the NPS scientist to working with the manager at the outset to select his highest priority projects to study, and then a continuing effort to gain a mutual understanding of what both hope to achieve by the research. This should sometimes include how data gathering--whatever is decided upon--will help the manager make a decision. In other words, we need desperately to better understand one another. We need better bridging of the communications gap that exists between manager and scientist.

Dr. Charlie Philpot of the U.S. Forest Service put this into perspective--perhaps as a manager might see it--when he asked the question at a Missoula, Montana Fire Conference in 1974, "Why is it, when a manager asks a researcher what time it is, the researcher tells him how to build a clock?" That type story could tend to polarize the two factions, except that it was told by a good scientist. So there's a strong need to understand each other better--to respect the important role that each must play in park management.

## BRIDGING THE GAP BETWEEN SCIENTIST AND MANAGERS: THE ROLE OF THE RESOURCE MANAGEMENT SPECIALIST

I feel that bridging the communications gap between the scientist and the superintendent or manager is a key role that the resources management specialist can and must play. As I would see it, researchers and resources management specialists relate to each other in this way:

(1) The scientist develops the basic strategy--a sound rationale for ecological action programs of prescribed burning or elk herd reduction, or he develops an understanding of subalpine or alpine vegetation ecosystems that can lead to management of numbers of park visitors--where required, often as part of backcountry or wilderness plans.

(2) Then the resources management specialist (or management biologist)--the second half of an essential team--deals with the tactical operations of actually doing controlled burning in a regular way, or guiding rangers in reducing exotic animal herds, or in carrying out the programs of rationing backcountry use--including some monitoring of the results of these programs. (The latter may be shared by the scientist and resources management specialist depending on whether we are into keeping in touch with results of management efforts.)

I see resources management specialists as key people in bridging the communications gap between science and management. Their role is vitally important and they need background experience and professional training as nearly equivalent to that of the scientist as possible. Some may have Ph.D.'s. But perhaps more typically, resources management specialists will have Master's degrees in some phase of natural science or resources management--and usually will have extensive and effective experience as managers of plant or animal resources in the parks.

An extremely important need in the Service now is to develop a solid, professional-resources management program. We need a career ladder for resource management specialists, an effective training program for such specialists, and a separate grade evaluation system to encourage them to become highly skilled specialists and not have to transfer to line management or to research in order to advance professionally. We should be able to recruit prospective resource management specialists directly from universities or from other assignments where their background experience qualifies them well.

When the scientist is performing an extension role in his contacts with field areas, his duties may overlap somewhat with the activities of the resources management specialist. I also see the scientist working closely with the resources management specialist in larger



parks to see that the resources management specialist and his staff are trained in resource monitoring and systematic record keeping.

I would see scientists and resources management specialists forming essential teams in larger parks, splitting the strategy and tactics of resources management, while in smaller parks, the scientist's part of the team would be provided by scientists stationed at CPSU's.

We'll see how far these ideas get in the next few years in the National Park Service. But some effective system for bridging the research-management gap must be found because managers need mission-oriented research. But not just the short-term brush fire efforts. Once you've identified a major issue, you need to go into in-depth studies of the various aspects of the ecosystem that are related to that particular problem. No way can we be superficial in our approach.

As Leopold has pointed out, when a researcher goes at a problem, he may tend to emphasize such things as:

1. The scientific relevance of the subject--with emphasis on understanding ecosystem structure and mechanics; and
2. How to get meaningful results with minimum time and funds of the researcher.

But a researcher must also emphasize points of great concern to the manager such as:

3. Methods of study that will get the data with minimum disruptive impact on the park; and
4. Ways to design the project to be of maximum use to the park manager.

A researcher owes a manager at least two things: a solid study that leads to publication and recommendations on how his research relates to management.

## WHERE THE RESEARCHER FAILS THE MANAGER. . . . AND THE MANAGER FAILS THE RESEARCHER. . .

All too often researchers fail in their job to assist managers and managers fail in their job to support researchers. Where the researcher most often fails the manager is when he:

- o carries out overly-sophisticated studies that are unrelated to management;
- o makes little effort to communicate the results of his research to the manager (including recommendations for action);
- o does not set up mutually agreed upon objectives at the beginning of the project and then follow through with reports and publications that are of value to the manager.

Where the manager may fail the researcher is by:

- o undercut efforts to work steadily on primary projects, often by involving him in "brush fire" projects.
- o by not communicating management problems he needs research answers for in a timely way or not seeking a researcher's input on whether a given resources problem should have priority consideration for limited research funding;
- o by putting research at the bottom of the priority list for funding (maybe cutting it first in order to fill chuckholes in his road);
- o by discouraging a researcher's participating in professional meetings or by discouraging him from completing publications.

### Success Stories...Teamwork and Cooperation:

But there are also a number of very fine examples of close cooperation between researchers and resource managers, and these are the models we ought to be looking at. Among them would be these:

1. The fine work on Barrier Islands - Ecology of Cape Lookout in North Carolina by Dr. Paul Godfrey. Paul worked closely with Park Superintendent Bob Barbee and others in gathering data and making recommendations based on solid research. With this better understanding of the ocean's interaction with sand and vegetation, it became clearer that the Park Service would be foolish to continue to fight the ocean and natural movements of Barrier Islands by trying to stabilize the islands with vegetation.

Through Paul's work and that of Dr. Robert Dolan, Bob Barbee and other managers have learned there is instead a "dynamic stability" in the true natural state of the Barrier Islands which are constantly shifting in response to natural forces and conditions. So managers are adjusting their action plans accordingly.

2. The fire ecology work in the Sierra Nevada at Sequoia and Kings Canyon and Yosemite--both prescribed burning and natural fire programs--has involved close working relationships between researchers and resource management specialists, and the need to reestablish natural fire frequencies and fire regimes has been both academically studied and practically managed by researchers. Testing of hypotheses has been carried out by both researchers and resource management specialists in a way which has allowed active management programs and development of new research data to go hand in hand. Both research and management have benefitted from this close working relationship.

3. Sociological and riparian studies on the Colorado River in Grand Canyon National Park have been carried out with close cooperation between researchers and resource managers and are now leading to development of plans for managing the very complex natural and sociological systems, with extensive input from the public adding to both the interest and complexity of this type of problem.

I want to describe the Colorado River sociological studies in greater detail as an example of a highly productive interaction between management and researchers. In 1972, Superintendent Merle Stitt knew he had problems with too many people on the river. He asked our Regional Chief Scientist for help, and Wally Wallis spent several months in 1973 lining up the initial contract research on beaches and riparian ecosystems. At about the same time, I asked Don Field for help in figuring out how to get a handle on carrying capacity for numbers of people in a sociological sense that we should allow on the river.

Don put me in touch with a number of top people in the sociological field who reviewed several early volunteer proposals received from scientists who had begun some studies on their own in the canyon. We were so impressed with the critique of one young colleague of Don's

that we hired him as a consultant to help us define the problem and write a call for proposals to get the job done. This professional consultant joined me on a trip to Grand Canyon, where he brainstormed the problem with Superintendent Stitt and his staff and tried to make sure what kinds of research would really be productive for park management. This sharp young consultant continually asked the question of Superintendent Stitt, "If I gather information which lets you know how many minutes a day members of a given river party spend within sight of another party, will this help you make a management decision? If I gather data on how often parties camp on beaches within sight or sound of other parties, will this help you make a decision?" He continued to pursue this line of questioning until he found those key elements which would be of greatest value and significance to the park manager.

Those items were then incorporated into the call for proposals sent out to a wide variety of prospective researchers. In other words, the researchers were not asked to do their thing on the river and let us know how we ought to manage the river, but they were asked specifically to provide the types of data which we had determined as being most likely to be of value to the manager in this difficult situation. Then, using an outside professional screening committee, approximately 17 proposals that were submitted were narrowed down to 6, and by a second careful screening, a final selection was made.

At this point in time, a draft Colorado River Management Plan and a draft Environmental Impact Statement have been through a whole series of public meetings and have generated considerable controversy on such issues as motor boats versus cars, allocations to private- versus concessioner-operated river and the like. It's here that research quality was essential.

Our researchers had to have already established themselves in the scientific community and to have a solid publication record, because their results--which managers are using as a basis for decisions--are being challenged by river runners and by other members of the public. Because our research base is solid, managers at Grand Canyon have a much better knowledge of the biological and sociological characteristics of the Grand Canyon river running environment and experience than they would have had in the absence of our Park Service contract research efforts.

The researchers will never provide all the specific data which a manager might want to make a decision between various options. The researcher, however, should provide enough data on impacts of various options so as to make more intelligent choices between options possible--and to provide solid data when challenges come.

## CONCLUSION

The consensus of a group of managers at the recent General Superintendents' Conference at Rocky Mountain was that "science is alive and well in the National Park Service. . .but there's room for improvements. . . ." And they singled out application of research findings as the link in the research-management chain most in need of strengthening. The best research in the world will accomplish little if professional resource managers do not use its findings to help solve management problems.

In conclusion, I recognize that managers may have some problems understanding scientists, but managers need what solid NPS scientists can offer, and managers probably need to work harder to understand scientists and to support them.

Conversely, while scientists may feel they are not getting enough support from managers, it may be they are not doing all they can to communicate solid results more effectively to the man who has the real-world decision to make. And while all information about processes that make park ecosystems go is useful, funds and time are in short supply, and hence the scientist owes it to the resource manager and to the superintendent to focus his efforts on scientific products of greatest value to the manager. With better teamwork, the parks will gain, because as a recent Leopold report notes:

"The National Park Service has reached a time in its history and in the history of the nation when science and research should be given a much greater and clearly recognized responsibility in policy making, planning, and operations. 'Seat-of-the-pants' guesses in resource preservation and management are open to challenge and do not stand up well in court or in the forum of public opinion.

"To be right in decisions affecting natural environments, and to serve its educational missions, the Service requires an increasingly sophisticated system of gathering new facts and getting them applied at all levels, from the backcountry to Washington."