Box 65: Commentary from the GWS Office and Our Members

Fuzzy Logic and National Park Service Resource Management Policy

uzzy logic and its companion, fuzzy thinking, are concepts that grew out of the idea that statements of fact are not all true or all false. Rather, their essence can lie somewhere between total truth and total falsehood, or somewhere between 0 and 1, instead of being one or the other, as we commonly perceive. Statements of fact are thus multivalent, implying a range of optional answers for any question, answers that, as a result, can be imprecise, vague, or, in a word, fuzzy (Kosko 1993).

I think most scientists and resource managers are uncomfortable with the idea of fuzziness. They want to believe in the sanctity of certain facts. They have little tolerance for uncertainty. Yet most of the studies ecologists conduct are filled with uncertainty. Shrader-Frechette and McCoy (1993) have written about the uncertainty associated with various "ecological theories" and the role that value judgments play in interpreting observational data. They suggest, for example, that general ecological theory has been unable to provide the scientific support necessary for conservation decisions. They may be correct, particularly with respect to ungulate management in parks.

Our uncertainty in understanding natural ecosystems makes it difficult to know the extent to which resource managers should intervene to manage nature in parks. This has been a long-standing and contentious dispute. Stewart Udall, when secretary of interior, commissioned a high-powered group of wildlife biologists in 1963 to help resolve this dispute. The resulting Leopold Report (Leopold et al. 1963) is a good example of fuzzy logic, and its recommendations have since been used by NPS administrators to support resource management policies that seek to minimize human intervention with the natural ecological processes of parks. Yet some scientists dispute that interpretation, and have asserted that the report actually articulated a very different message, i.e., it recommended active intervention in the management of park resources when necessary (Wagner et al. 1995). What these opposing viewpoints have meant in practice is that the extent to which NPS managers have intervened in natural processes in a given park has been a matter of degree, depending on the situation and type of resource, and the social, political, and scientific pressures that have been applied. Depending on which side one is on, NPS resource management actions (or non-actions) with respect to any resource problem have been characterized as either enlightened or scientifically flawed. However, in my opinion, such attitudes may be a necessary adjunct of an agency obligated to make management decisions in the multivalent world of ecological science.

Fuzzy thinking was probably embedded in NPS culture as a result of the 1916 establishing legislation, or Organic Act, which founded the agency. The legislation directs the agency to both preserve park resources and provide for public enjoyment of the same. Note that the act does not say "preserve *or* provide." Much has been written about the paradoxical nature of this mandate, most of it critical. For example, Foresta (1984) wrote that "if use destroys, how can a management policy both accommodate use and preserve a natural area? A mandate which is inherently contradictory must, by logical extension, become a management dilemma—a problem for which there is no solution that does not violate a restraint."

In spite of such criticisms, historians assert that there was, however, a real purpose behind the way the Organic Act was written by the environmental leaders of the day (Sellars 1997). These leaders sought to create legislation that provided the first NPS administrators with as much freedom as possible to manage the resources in the way they judged best. The ambiguous nature of the mandate maximized flexibility and meant that almost any management action could be justified as long as it either aided resource preservation or public enjoyment. In general, however, the authors of the Organic Act recognized that management would require a balance between the two extremes, and they trusted the discretion of agency personnel to find the appropriate balance. Thus the agency started out with a fuzzy mandate, and given the unique problems it encountered, this mandate probably served the agency well.

In recent years, there are many instances where the fuzzy nature of the mandate has been used by critics to fight various NPS policies. There has been a tremendous growth in the number and power of special-interest groups who do not trust agencies in general and who don't want to see resource managers left to manage according to their own discretion. As these groups vie to influence the direction of NPS policy, battles which once took place almost exclusively within agency ranks or occasionally in Congress now take place in federal court, state court, before county commissioners, and governor's commissions. Equally as important, all groups use the ambiguous wording of the Organic Act to project their own values on how nature should be preserved or manipulated in parks (Cheever 1997).

This situation has caused one legal scholar to suggest that the greatest risk to the NPS is the incremental or piecemeal erosion of long-standing resource management policies as a result of local political pressure and scientific criticism. And it has led some scholars to ask if the agency could benefit from new congressionally passed organic legislation telling it exactly what to do, i.e., a less fuzzy mandate (Cheever 1997). The fact that the agency benefited from vagueness in the past does not necessarily mean it does so today. Advocates of that viewpoint argue that it would be useful to have an agency mission statement that was more than a mirror, reflecting back the values of each interest group itself. They feel a clearer mission statement, conveying the same message to all interested parties, would not guarantee enhanced agency stature and discretion but would at least make it possible.

Another criticism of the NPS has been that it has used the ambiguities inherent in the Organic Act to emphasize the development of facilities for visitor use at the expense of resource protection. Again, this is a fuzzy issue, and such comments simplify a complex problem. Almost all parks, from the time of their establishment, have recognized the importance of accommodating tourism and providing for public enjoyment. This was the primary reason most of them were established (Wright 1992). Historians affirm that tourism and public enjoyment have long provided a viable rationale for the national park movement and provided the political support the NPS desperately needed in its early years. The agency learned very early that the best way to enhance tourism and to ensure public enjoyment was to have natural resource management actions serve tourism purposes (Sellars 1997). Little has changed over the years, although actions today are clearly more ecologically sensitive. And given the importance of public support and the power of public opinion, it is difficult to see how things can change today.

Currently, the increase in numbers of various species of ungulates has brought on one of the strongest challenges to the policy of minimal human intervention. There are now increasing demands that park managers actively intervene to control or reduce certain populations (Wagner et al. 1995). Do these demands conflict with policy? In general, it seems clear that active intervention can certainly be supported by the Organic Act. Whether it can be supported by ecological science is another issue. It can be argued that in many cases, ecological science does not have the necessary understanding to provide confident answers to important resource management questions, including how many animals a specific habitat can support.

Are there advantages for the NPS to maintain policies that are fuzzy? One would probably say "yes" only if one trusted the agency's ability to manage its resources properly. For a wide variety of resource issues ranging from facility development to endangered species management to ungulate population control, there are many people who do not want to leave the agency to its own discretion. However, the alternative of potentially having Congress impose its values and mandates in new laws could be equally frightening. I feel that there is a value to the NPS in retaining a fuzzy mandate. Yet in doing so the agency needs to recognize that it must have a strong foundation of sound scientific knowledge to support fuzzy management policies. In many cases in the past, NPS policies were not supported by strong science. We now look back to those days with wonderment. In some cases the agency was criticized, but usually it still managed to muddle through. That luxury no longer exists today (Wright, in press). The NPS now faces much greater scrutiny and persistent criticism. Some individuals criticize the agency because of its fuzzy policy. I feel fuzzy policy can be acceptable if it is supported by sound scientific knowledge. The converse—fuzzy policy underlain by uncertain science—is, on the other hand, probably not tenable. In my opinion, if the NPS hopes to maintain support for its unique, if fuzzy, resource management policies, these policies must by supported by a strong foundation of scientific knowledge.

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