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Overcoming Barriers to the Use of Science in National Parks (Session Summary)

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Introduction

Following passage of the 1998 National Parks Omnibus Management Act (also known as the Thomas Bill), the National Park Service (NPS) secured funding through the Natural Resource Challenge (NRC) to promote scientifically sound management of parks, increase the scientific community's involvement in providing needed information, and facilitate education to engage the public as partners in resource preservation. Two NRC programs, the park-based Research Learning Centers (RLCs) and the university-based Cooperative Ecosystem Studies Units (CESUs), aim to meet the science needs of parks through facilitating research by external scientists that directly addresses management-identified needs. These programs can only be successful if relevant research results are effectively transferred to park resource specialists and then on to decision-makers so that scientific knowledge can be considered when planning and managing for park management goals. Despite a mandate to use the highest-quality science and information for management, a variety of practical challenges remain. This paper summarizes observations made by NPS participants at a 2005 George Wright Society (GWS) Conference day-capper session to overcome challenges to the use of science for park management (Figures 1–2).

Communication

For scientific research to inform management, results must be effectively delivered to the resource specialists who make management recommendations, to the managers who make decisions, and to members of the public who provide input to or are affected by management decisions. According to communication studies, effective communication refers to the development of a common understanding, such as an understanding about the meaning and potential utility of specific research results. However, communication research elucidates that people frequently report leaving the same encounter with different perceptions of that encounter. Thus, it is not surprising that a research scientist or a resource specialist presents research results in what she or he perceives to be clear terms, and then the intended recipient of that information returns to his or her daily tasks with a modified perspective of what the speaker intended to communicate, with continued uncertainty, and/or a lack of interest that leads to passive rejection of innovations.

Participants at the 2005 GWS day-capper session cited a lack of understanding and/or interest in the results of scientific research as a primary barrier to its use. Particular attention was given to the link between public understanding of scientific information and public support for decisions and actions informed by science. Session participants noted that an important component of receptivity to scientific information is trust in the scientist and/or the agency's science communicator. Consequently, resource staff must sometimes spend extra

Figure 1. Suggestions for reducing barriers when communicating scientific information to resource management specialists, park managers, or the public.

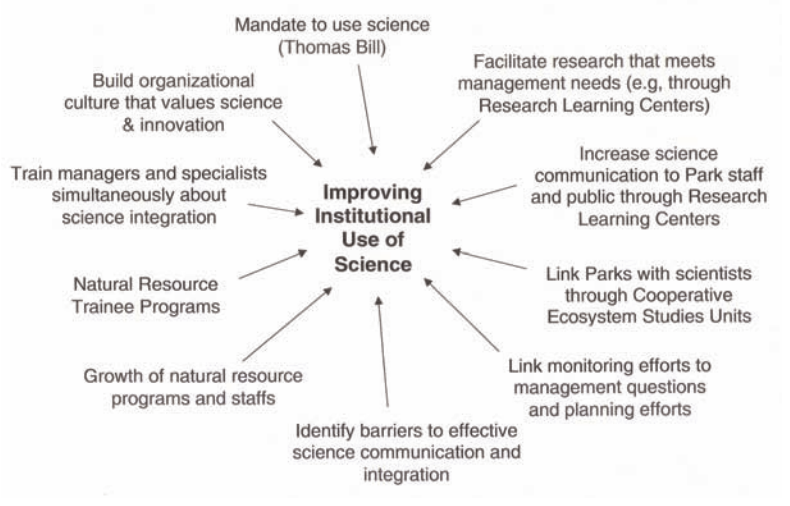

Figure 2. Current and past institutional efforts to improve both the availability and use of scientific information to meet park management goals.

time documenting information beyond what they see as necessary so they can build trust in management recommendations or decisions. Berger (1997) discusses the need to predict the beliefs and actions of message recipients in order to produce effective messages. He suggests some message uncertainty can be reduced in advance by acquiring information about the social context in which messages are likely to be received. This was consistent with observations raised during the session that it is important to communicate relevance by connecting with people's values, and that external circumstances can increase the perceived relevance of,

and thus receptivity to, scientific information. For example, people who actually see glaciers melting in Alaska may be more receptive to the scientific support for climate change than those in warmer states who have never seen melting glaciers. A second example focused on the role of the 2000 fire season in increasing receptivity to scientific information related to ecosystem restoration. Session participants also noted that people might be more receptive to scientific information when they are looking for it, such as at conferences or workshops.

Additionally, participants discussed potential communication barriers between non-NPS scientists or park resource specialists and park managers. In general, people are more likely to pay attention to messages about scientific products if they perceive the messages to be relevant to their goals or needs (Rogers 1995). Participants underscored the importance of targeting different types of information to different management levels. For instance, as one communicates higher up the chain, the science communicator must resist the temptation to focus on the technical information and instead focus more on the interpretation and the applied aspects. Participants reminded scientists that when they are communicating about research results, it is important to first gain an understanding of the culture of the audience, and then adapt to that culture before attempting to communicate. Communicators must start by addressing the audience's need (e.g., to inform current management dilemmas or avoid litigation on a particular topic) and then share pertinent scientific information. They mentioned that scientific information that is understood and accepted can give managers more confidence in defending their decisions.

Individual barriers

Even with clear communication, decisions to adopt scientific findings can be influenced by an individual's beliefs and values about science; their comfort with risk and uncertainty; organizational values related to science, innovativeness, and learning; and the institutional capacity to apply science.

Participants reminded science communicators that some individuals are embarrassed to ask the necessary questions to understand research results and how they can be applied to management. For instance, many managers received the last of their formal education two or three decades ago, and so may not have the context for applying current information. Additionally, scientists, resource specialists, and managers often have different personality types with regard to both learning and communicating. Participants noted that individuals with different personality types are drawn toward different types of positions and are motivated by different types of rewards. Scientists may be more focused on learning but less on communication, whereas managers may be more extroverted but less interested in information for the sake of learning. Thus, differences in education and training backgrounds are confounded by the fact that some people are motivated by learning, whereas others are sometimes intimidated by it. The diffusion of innovations theory (Rogers 1995; Wright 2004) offers an in-depth explanation of different types of personalities regarding comfort with the uncertainty of adopting new ideas as well as the value of finding "opinion leaders" who are well respected by peers and can effectively communicate new ideas. According to participants, it is imperative that some individuals are positioned to bridge the gap between those who either have different personalities or were trained differently.

Institutional barriers

Participants also discussed the changing organizational culture within the NPS and how that has influenced both the communication and use of science. Sellars (1997) provides an historical explanation of traditional NPS culture, which was described during the session as top-down and militaristic, with most power residing with the superintendent and the ranger division. Participants cited several efforts that have contributed to a changing organizational culture that they see as slowly becoming more collaborative, team-oriented, and scientifically informed. These include the Natural Resource Trainee Program of the 1980s, the separation in many parks of the resource management and visitor protection divisions, and the various new programs that have been developed through the Natural Resource Challenge. According to participants, these efforts have increased the number of innovators and scientifically trained people in the Park Service.

Also encouraging has been the level of participation and interest at recent GWS conferences to enhance communication about the contributions of science to resource stewardship. With nearly 800 participants and over 100 concurrent sessions, there were hundreds, if not thousands, of formal and informal discussions at this year's conference about how to incorporate current scientific knowledge on topics such as fire, climate, wildlife, invasive plants, recreation, and wilderness into management. In addition to such issue-centered discussions, at other sessions RLC staff members shared information about how they are identifying park-based information needs, facilitating research to meet these needs, and working to transfer research results to agency resource specialists, interpreters, and directly to the public. The CESUs described how they are successfully linking federal and academic scientists with parks that have identified science needs, the Inventory and Monitoring Network staff discussed how to ensure that monitoring data are applied to management questions and incorporated into park planning, and the Horace M. Albright Training Center described an upcoming innovative training project to bring upper-level managers, staff specialists, and scientists together to address the challenges of incorporating science and politics into complex management decisions.

Conclusion

Although nearly every resource specialist, manager, and research scientist can describe practical barriers to applying scientific information, this session left me feeling optimistic that NPS resource managers and GWS conference participants are working hard to overcome those barriers. The Aldo Leopold Wilderness Research Institute's Research Application Program (RAP) is beginning a systematic research effort designed to understand influences on the use of science by managers in the NPS, the Bureau of Land Management, and the U.S. Forest Service. The project will be informed by the social science literature on communication, organizational learning and behavior, decision-making, and social psychology, as well as discussions such as the one described here which are critical for understanding the context in which NPS managers strive to apply scientific information. Through this project, the RAP hopes to (1) improve understanding of the factors that influence when agency decision-makers and staff specialists decide to adopt and use scientific products, (2) identify barriers to the effective communication and application of science, and (3) provide suggestions

for increasing the effectiveness and efficiency of science delivery efforts. More effective science delivery will lead to faster integration of relevant science by managers, and it will increase agency credibility by improving the chances that managers as well as the public have access to and understand the best available science.

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