Emerging Principles for Using Information/Education in Wilderness Management

BY ROBERT E. MANNING

Abstract: Studies on information/education as a wilderness management practice are highly diverse, providing both theoretical and empirical understanding, employing a variety of message types and media, and addressing a variety of management issues and target audiences. Generally, these studies suggest that information/education can be an effective and desirable management tool. Moreover, a number of principles for using information/education tools are emerging from this literature.

Introduction

Information/education is generally seen as an "indirect" and "light-handed" wilderness management tool; it is designed to persuade visitors to adopt behaviors that are compatible with wilderness management objectives without regulating visitors directly. This approach tends to be viewed favorably by wilderness visitors (Roggenbuck and Ham 1986; Stankey and Schreyer 1987; McCool and Lime 1989; Roggenbuck 1992; Vander Stoep and Roggenbuck 1996; Hendee and Dawson 2002). Research suggests that information/education can be effective, and a set of principles for application to wilderness management is emerging.

Conceptual and Theoretical Foundations

Problem behaviors of wilderness visitors can be classified into five basic types (see Table 1), and this conceptual approach suggests the potential effectiveness of information/education on each. At the two ends of the spectrum, problem behaviors can be seen at either deliberately illegal or unavoidable. In these situations, information/education may have limited effectiveness. However, for the other three types of problem behaviors—careless actions, unskilled actions, and uninformated actions—may be considerably more amenable to information/education programs.

Another approach to describe the application of information/education relates to the "mindfulness" or "mindlessness" of visitors (Moscato 1999). "Mindfulness" relies on existing behavioral routines, and this may limit a visitor's ability to recognize and process new information. Alternatively, a "mindful" visitor actively processes new information, creates new categories for information, and consciously thinks about appropriate ways to behave. Strategies to enhance mindfulness can facilitate learning and better decision-making (Moscato 1999).

A third conceptual approach to the application of information/education is based on two prominent theories of moral development (Kohlberg 1976; Gilligan 1982). Both theories suggest that people tend to progress through stages of moral development, ranging from being very self-centered to highly moral individuals. Therefore, it is possible that information/education could be designed to meet the needs of each stage of moral development, thereby increasing its effectiveness.

(Peer Reviewed)
<table>
<thead>
<tr>
<th>Type of Problem</th>
<th>Example</th>
<th>Potential Effectiveness of Information/Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illegal actions</td>
<td>Theft of Indian artifacts; use of wilderness by motorized road vehicles</td>
<td>Low</td>
</tr>
<tr>
<td>Careless actions</td>
<td>Littering; shouting</td>
<td>Moderate</td>
</tr>
<tr>
<td>Unskilled actions</td>
<td>Selecting improper campsite; building improper campfire</td>
<td>High</td>
</tr>
<tr>
<td>Uninformed actions</td>
<td>Using dead snags for firewood; camping in sight or sound of another group</td>
<td>Very high</td>
</tr>
<tr>
<td>Unnatural actions</td>
<td>Disposing of human waste; trampling ground cover vegetation at campsite</td>
<td>Low</td>
</tr>
</tbody>
</table>

altistic, based on principles of justice, fairness, and self-respect. A wilderness visitor may be at any of the stages of moral development. Management implications are that information/education should be designed to reach visitors at each of these stages (Christensen and Dustin 1989; Duncan and Martin 2002). For example, to reach visitors at lower levels of moral development, managers might emphasize extrinsic rewards or punishments for selected types of behavior. However, communicating with visitors at higher levels of moral development might be more effective by emphasizing the rationale for selected behaviors and appealing to a sense of altruism, justice, and fairness.

Fourth, communication theory suggests that the potential effectiveness of information/education is dependent upon a number of variables associated with the content and delivery of messages to visitors (Roggenbuck and Ham 1986; Stankey and Schreyer 1987; Manfredo 1989; Vadee et al. 1990; Manfredo and Bright 1991; Manfredo 1992; Roggenbuck 1992; Bright et al. 1993; Bright and Manfredo 1995; Rasman et al. 1996; Vander Steen and Roggenbuck 1996). For example, visitor behavior is at least partially driven by attitudes, beliefs, and normative standards. Information/education aimed at “connecting” with or modifying relevant attitudes, beliefs, or norms may be successful in guiding or changing visitor behavior. Moreover, the substance of messages and the media by which they are delivered may also influence the effectiveness of information/education programs.

Finally, from a theoretical standpoint, information/education can be seen to operate through three basic models (Roggenbuck 1992):

1. Applied behavior analysis. This approach to management focuses directly on the behavior of the audience and on the circumstances surrounding the behavior. Applied behavior analysis is the simplest and most direct theoretical model of information/education. However, since it does not address the underlying variables such as attitudes, beliefs, and norms, its effectiveness may be short-term and dependent upon continued application.

2. Central route to persuasion. In this model, relevant beliefs of visitors are modified through delivery of substantive messages. New or modified beliefs tend to lead to desired changes in behavior. While this is a less direct and more complex model, it may result in more lasting behavioral modification.

3. Peripheral route to persuasion. This model emphasizes nonsubstantive elements of information/education messages, such as message source and medium. For example, messages from sources considered by visitors to be authoritative or powerful may influence behavior, while other messages may be ignored. This model may be especially useful in situations where it is difficult to attract and maintain the attention of visitors, such as at visitor centers, ranger stations, and bulletin boards, all of which may offer multiple and competing information/education messages. However, like applied behavior analysis, the peripheral route to persuasion may not influence antecedent conditions of behavior and, therefore, may not have lasting effects.

Empirical Evaluations of Effectiveness

Empirical studies have examined the effectiveness of a variety of wilderness-related information/education programs. These studies can be described as:

1. Those designed to influence visitor use patterns; (2) studies focused on enhancing visitor knowledge, especially knowledge related to minimizing ecological and social impacts; (3) studies aimed at influencing visitor attitudes toward management policies; and (4) studies that address deprecatory behavior such as littering and vandalism.
1. Visitor Use Patterns: Wilderness visitor use patterns are often of uneven spatial and temporal distribution. Campsite impacts and crowding may be reduced if use patterns could be changed. An early study in the Boundary Waters Canoe Area in Minnesota explored the effectiveness of providing visitors with information on current use patterns as a way to alter future use patterns (Hume and Lucas 1977). Visitors who had permits for the most heavily used entry points were mailed an information packet including a description of use patterns, noting in particular heavily used areas and times. A survey of a sample of this group who again visited the study area the following year found that three-fourths of respondents felt that this information was useful, and about one-third were influenced in their choice of entry point, route, or time of subsequent visits.

A study in the Shining Rock Wilderness Area, in North Carolina was designed to disperse camping away from a heavily used meadow (Waggoner and Berrier 1981, 1982). In this treatment, a brochure explained resource impacts associated with concentrated camping and showed the location of other nearby camping areas. Another group was given the brochure in addition to personal contact with a wilderness ranger. Both groups dispersed their camping activity to a greater degree than a control group, but there was no statistically significant difference between the two treatment groups.

Prior to obtaining a backcountry permit, a simple group of hikers in Yellowstone National Park (Montana, Wyoming, and Idaho), was given a guidebook that described the attributes of lesser-used trails (Krupski and Brown 1982). Through a later survey and examination of permits, it was found that 37% of this group had selected one of the lesser-used trails compared to 14% of a control group. Results also indicated that the earlier the information was received, the more influence it had on behavior. Studies employing user-friendly microcomputer-based information approaches (e.g., "touch-screen" programs) have also been found to be effective in influencing recreation use patterns (Huffman and Williams 1986, 1987; Holsman, 1988, Harman 1992, Alpern and Harman 1988).

Hikers in the Pemigewasset Wilderness in New Hampshire were studied to determine the influence of wilderness guidelines as a source of information/education (Brown, Palensick, and Luloff 1992). Only about 20% of visitors reported that the information received from wilderness rangers influenced their destination within the study area. However, visitors who were less experienced and who reported that they were more likely to return to the study area were more likely to be influenced by the information provided.

Potential problems in using information/education to influence visitor use were illustrated in a study in the Selway-Bitterroot Wilderness in Montana (Lucas 1981). Brochures describing current recreation use patterns were distributed to visitors. Follow-up measurements indicated little effect on subsequent use patterns. Evaluation of this program suggested three limitations on its potential effectiveness: (1) many visitors did not receive the brochure, (2) most of those who did receive the brochure viewed it too late to affect their decision making, and (3) some visitors doubted the accuracy of the information contained in the brochure.

2. Visitor Knowledge: A second category of studies has focused primarily on enhancing visitor knowledge to reduce ecological and social impacts. In Rocky Mountain National Park in Colorado (Fazio 1978b), information was provided on low-impact camping practices through a series of media. Exposure to a slide/sound exhibit, a slide/sound exhibit plus a brochure, and a slide/sound exhibit plus a trailhead sign resulted in significant increases in visitor knowledge. Exposure to a trailhead sign and brochure was not found to be very effective.

In a more recent study, a sample of day hikers to subalpine meadows in Mt. Rainier National Park in
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Manfredo and Bright (1991). Visitors requesting information on wilderness permits for the Boundary Waters Canoe Area Wilderness in Minnesota were mailed the special brochures. In a follow-up survey, only 18% of respondents reported that they had received any new information from the brochure, and only 7.5% reported that they had altered their actual or intended behavior.

Visitor Attitudes. A third category of studies has examined visitor attitudes toward a variety of management agency policies (Skaburskis 1982, Olson, Bowman, and Roth 1984, Nielson and Buchman 1986, Cable et al. 1987, Manfredo, Yuan, and McGuire 1992; Bright et al. 1993; Randtke 1994). These studies have found that information/education can be effective in modifying visitor attitudes so they are more supportive of wilderness and related land management policies. For example, visitors to Yellowstone National Park in Montana, Wyoming, and Idaho were exposed to interpretive messages about fire ecology and the effects of controlled-burn policies (Bright et al. 1993). These messages were found to influence both beliefs about these issues and attitudes based on these beliefs.

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littered areas (Burgess, Clark, and Hendee 1971; Clark, Hendee, and Campbell 1971; Marler 1971; Clark, Burgess, and Hendee 1972a, b; Powers, Osborne, and Anderson 1973; Lahart and Bailey 1975; Muth and Clark 1978; Christensen 1981; Christensen and Clark 1983; Oliver, Roggenbuck, and Watson 1985; Christensen 1986; Roggenbuck and Prusmeier 1986; Winder Scoep and Gramans 1987; Horley 1988; Waegemans and Wilson 1988; Christensen, Johnson, and Brooks 1992; Taylor and Winer 1995). For example, samples of visitors to a developed campground were given three different treatments: a brochure describing the costs and impacts of littering and vandalism, the brochure plus personal contact with a park ranger; and treatment plus a request for assistance in reporting deprecative behaviors to park rangers (Oliver, Roggenbuck, and Watson 1985). The brochure plus personal contact was the most effective treatment: this reduced the number of groups who littered their campsite from 67% to 41% and reduced the number of groups who damaged trees at their campsite from 20% to 4%. Types of messages and related purposes found to be effective in a number of studies include incentives to visitors to assist with clean-up efforts and the use of rangers and trip leaders as role models for cleaning up litter.

Other Types of Studies

Several other types of studies, while not directly evaluating the effectiveness of information/education, also suggest the potential of information/education for wilderness management. First, studies of visitor knowledge indicate that marked improvements are possible, which could lead to improved visitor behavior. For example, campers in the Allegheny National Forest in Pennsylvania were tested for their knowledge of the area’s rules and regulations (Romo and Moeller 1974). Only 48% of respondents answered six or more of the 10 questions correctly. A similar study of visitors to the Selway-Bitterroot Wilderness Area in Idaho tested knowledge about wilderness use and management (Fazio 1979a). Only about half of the 20 questions were answered correctly by the average respondent. However, there were significant differences among types of responses, type of knowledge, and the accuracy of various sources of information, providing indications of where and how information/education might be channeled most effectively. Visitors to the Allegheny National Forest in Pennsylvania received an average score of 48% on a 12-item true-false minimum impact quiz (Confer et al. 2000), while visitors to the Selway-Bitterroot National Forest in Montana received an average score of 33% on a similar quiz (Cole, Hammond, and McCool 1997).

Second, several studies indicate that information/education programs could be substantially improved (Brown and Hunt 1969; Fazio 1979b; Cockrell and McLaughlin 1982; Fazio and Ratcliffe 1989). Evaluation of literature mailed in response to visitor requests has turned up several areas of needed improvements.

<table>
<thead>
<tr>
<th>Practice</th>
<th>Percentage used</th>
<th>Mean perceived effectiveness rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brochures</td>
<td>74</td>
<td>2.5</td>
</tr>
<tr>
<td>Personnel at agency offices</td>
<td>70</td>
<td>2.7</td>
</tr>
<tr>
<td>Maps</td>
<td>68</td>
<td>2.1</td>
</tr>
<tr>
<td>Signs</td>
<td>67</td>
<td>2.3</td>
</tr>
<tr>
<td>Personnel in backcountry</td>
<td>65</td>
<td>3.8</td>
</tr>
<tr>
<td>Displays at trailheads</td>
<td>35</td>
<td>2.6</td>
</tr>
<tr>
<td>Displays at agency offices</td>
<td>48</td>
<td>2.7</td>
</tr>
<tr>
<td>Posters</td>
<td>48</td>
<td>2.3</td>
</tr>
<tr>
<td>Personnel at school programs</td>
<td>47</td>
<td>2.9</td>
</tr>
<tr>
<td>Slide shows</td>
<td>35</td>
<td>2.9</td>
</tr>
<tr>
<td>Personnel at campgrounds</td>
<td>35</td>
<td>2.9</td>
</tr>
<tr>
<td>Personnel at public meetings</td>
<td>34</td>
<td>2.8</td>
</tr>
<tr>
<td>Personnel at trailheads</td>
<td>29</td>
<td>3.3</td>
</tr>
<tr>
<td>Personnel at visitor centers</td>
<td>26</td>
<td>3.0</td>
</tr>
<tr>
<td>Videos</td>
<td>26</td>
<td>2.5</td>
</tr>
<tr>
<td>Agency periodicals</td>
<td>18</td>
<td>2.3</td>
</tr>
<tr>
<td>Displays at visitor centers</td>
<td>18</td>
<td>2.5</td>
</tr>
<tr>
<td>Guidemaps</td>
<td>13</td>
<td>2.3</td>
</tr>
<tr>
<td>Interpreters</td>
<td>11</td>
<td>3.6</td>
</tr>
<tr>
<td>Computers</td>
<td>11</td>
<td>1.9</td>
</tr>
<tr>
<td>Commercial radio</td>
<td>9</td>
<td>1.9</td>
</tr>
<tr>
<td>Commercial periodicals</td>
<td>8</td>
<td>2.4</td>
</tr>
<tr>
<td>Moon</td>
<td>7</td>
<td>2.6</td>
</tr>
<tr>
<td>Commercial television</td>
<td>4</td>
<td>2.3</td>
</tr>
<tr>
<td>Agency radio</td>
<td>4</td>
<td>1.4</td>
</tr>
<tr>
<td>Mean of personal-based techniques</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>Mean of media-based techniques</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>Mean of all techniques</td>
<td>2.6</td>
<td></td>
</tr>
</tbody>
</table>

Effectiveness scale: 1 = "not effective"; 5 = "highly effective"
Emerging Principles for Designing and Implementing Wilderness Information/Education Programs

Despite the fact that the studies described above are diverse in terms of geographic area, methods, and issues addressed, a number of principles for using information/education are emerging from the scientific and professional literature (Roggenbuck and Ham 1986; Brown, McCool, and Manfredo 1987; Manfredo 1989, 1992; Roggenbuck 1992; Doucette and Cole 1993; Bright 1994; Bannister et al. 1996; Vander Steen and Roggenbuck 1996):

- Information/education programs may be most effective when applied to problem behaviors that are characterized by carelessness, unskill, or uninformed actions.
- Information/education programs should be designed to reach visitors at multiple stages of moral development.
- Information/education programs designed to “connect” with or modify visitor attitudes, beliefs, or norms are likely to be more effective in the long-term and to require less repeated application.
- Use of multiple media to deliver messages can be more effective than use of a single medium.
- Information/education programs are generally more effective with visitors who are less experienced and who are less knowledgeable.
- Brochures, personnel, messages, and audiovisual programs may be more effective than signs.
- Messages may be more effective when delivered early in the visitor experience, such as during trip planning.
- Messages from sources judged highly credible may be especially effective.
- Strongly worded messages and aggressive delivery of such messages can be an effective way of enhancing the “mindfulness” of visitors, and may be warranted when applied to issues such as visitor safety and protection of critical and/or sensitive resources.
- Computer-based information systems (e.g., “touch screen” educational programs) can be an effective means of delivering information/education.
- Messages on earphones and bulletin boards should probably be limited to a small number of issues, perhaps as few as two.
- Training of volunteers, outfitters, and commercial guides can be an effective approach to information/education.

Figure 2—Southwest Alaska Discovery Center. Photo by Robert Manning.
and efficient means of communicating information/education.

Nonagricultural media, such as newspapers, magazines, and guidebooks can be an effective and efficient means of communicating information/education.

Information on the impacts, costs, and consequences of problem behaviors can be an effective information/education strategy.

Role modeling by wilderness users and volunteers can be an effective information/education strategy.

Personal contact with visitors by rangers or other employees can be effective in communicating in information/education.

Messages should be targeted to specific audiences to the extent possible. Target audiences that might be especially receptive include those who request information in advance and those who are least knowlegible.

Messages should be targeted at issues that are least well understood or known by visitors.

Studies on information education suggest that this can be an effective and desirable management tool. Generally, the 12 principles outlined above are based on understanding both the theoretical and empirical studies reported to date, and they recommend employing a variety of message types in media and addressing a variety of management issues and target audiences.

REFERENCES


Eichelberger, H., R. Leonard, and M. Haunold.
long and rich careers dedicated to the protection of our national wilderness treasures. Moreover, we would like to see an integrated and collaborative system of wilderness stewardship forged across the four wilderness management agencies in the United States. Given the institutional and disciplinary fragmentation of wilderness stewardship professionals, we see these goals as a contextually uphill climb. The voice of a committed cadre of wilderness stewards could be an important development, and a professional society for wilderness stewardship could be that voice.

REFERENCES


Concluding

In welcoming readers to the first issues of WM in 1965, John Heneke expressed that after 20 years of discussion about a wilderness journal that "the time is right." Given the success of the journal and several other initiatives over the past 11 years, it is clear that he was correct. The idea of a wilderness profession has been discussed for over a decade and perhaps the time is right for that as well. We would like to envision a future in which students could get degrees in wilderness stewardship that would prepare them for EMERGING PRINCIPLES on page 27


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limited financial funding, this is often not possible. Therefore, in addition to conducting site visits and giving presentations at management workshops, the Leopold Institute intends to continue synthesizing existing information on key wilderness issues. We will also continue to identify barriers to research application as well as potential solutions. While research results are interesting to inquiring minds, they are of little use without wilderness stewardship when managers are not aware of relevant results.

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