The Effect of Persuasive Communication Strategies on Rural Resident Attitudes Toward Ecosystem Management

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This study examined ways of generating favorable public attitudes toward ecosystem management (EM). Five hundred rural residents of the Chattooga River Basin (CRB) participated in a telephone survey. A recent Forest Service message on EM was compared with four messages developed using the elaboration likelihood model (ELM) and a control (no message) group in their ability to produce favorable attitudes toward EM. The four ELM messages were generated using combinations of high versus low personal relevance and strong versus weak argument strength. The interaction of argument strength and personal relevance along with prior knowledge of EM was also explored. Results show that (1) generally, CRB residents have very low knowledge of EM and (2) the most favorable attitudes were associated with messages containing strong arguments. Evidence of a three-way interaction (personal relevance by knowledge by argument strength) was found. Explanations for the three-way interaction as well as theoretical and applied implications of the study findings are discussed.

Received 26 September 1995; accepted 3 July 1996.

The authors thank three anonymous reviewers for their comments; the manuscript was much improved with their assistance.

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Society & Natural Resources, 10:537–550, 1997
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0894-1920/97 $12.00 + .00

Keywords argument strength, attitudes, ecosystem management, elaboration likelihood model, knowledge, personal relevance

Federal land management agencies are required to assess public opinion when introducing new policies such as ecosystem management (EM). Unfortunately, the complexity of many current natural resource issues often means that few citizens have adequate knowledge to develop well-formed opinions. Not only can a lack of knowledge transcend into a lack of support for a given policy, but publics possessing unfavorable attitudes and/or erroneous information about an issue can have a detrimental effect on the decision-making process. Recently, public natural resource agencies have begun to recognize the value of developing communication strategies that are both informative and effective in generating favorable public attitudes toward a given issue (e.g., Bright et al. 1993; Manfredo and Bright 1991). This study compared the effect of a U.S. Department of Agriculture (USDA) Forest Service communication with persuasive messages (developed using attitude change theory) on changing public attitudes toward EM.

In 1992, the then chief of the Forest Service (FS), F. Dale Robertson, introduced EM as:

> an ecological approach to achieve multiple-use management of the National Forests and Grasslands by blending the needs of people and environmental values to sustain diverse, healthy, and productive ecosystems. We will combine our scientific knowledge and experience about patterns of relationships among organisms and their environment with the *land wisdom* of people from many sectors and cultures of our society to care for the land and serve the people. (Williams 1994, 1)

Theoretical Development of an EM Message

Since the early 1980s, theoretical advancements in social psychology of attitude change have focused on the cognitive response approach (Chaiken and Stangor 1987; Cooper and Croyle 1984; Tesser and Shaffer 1990). The cognitive response approach emphasizes the thoughts elicited by a person while attending to a communication strategy (Petty et al. 1981). One of the most influential theories of attitude change has been Petty and Cacioppo's (1986) elaboration likelihood model (ELM) (Olson and Zanna 1993). The ELM proposes two routes to attitude change: central and peripheral. Attitude change via the central route occurs when recipients possess the motivation and ability to elaborate, or scrutinize, issue-relevant arguments in a message. The peripheral route dominates when individuals lack the motivation and/or ability to process information; as a result, factors other than the message arguments (e.g., attractiveness of the source, mood, and number of message arguments) determine the extent of persuasion. Attitude change resulting from the central route is more stable and permanent than change occurring via the peripheral route. We focused on the central route to persuasion.

Message Elaboration

Recent persuasion research has addressed various situational and individual variables that either motivate or enable recipients to elaborate on message information. Variables that motivate issue-relevant thinking include high (versus low) personal relevance, high (versus low) need for cognition, the use of rhetorical (versus assertive) questions, and second- (versus third-) person pronouns in the message statement. Enabling factors include direct

(versus indirect) experience with the attitude object, high (versus low) levels of issue-relevant knowledge, repeated (versus single) exposure to message arguments, and low (versus high) levels of distraction (Petty and Cacioppo 1981a, 1981b, 1986; Tesser and Shaffer 1990). This study addressed the effect of personal relevance and issue-relevant knowledge on attitude change.

Personal relevance, or involvement with the issue under consideration, has been identified as the most important factor influencing a recipient's motivation to process a message (Ajzen 1992; Petty et al. 1991; Shavitt and Brock 1986). In previous studies, personal relevance has been manipulated using messages where the issue is likely to have some personal or direct implications for the message recipient (e.g., Apsler and Sears 1968). For example, Petty et al. (1983) increased personal relevance with an advertised topic (a disposable razor) by informing message recipients that the product would or would not be available in their local area.

According to Petty and Cacioppo (1981a, 1981b, 1986, 1990), one of the most important variables affecting the direction of message elaboration (i.e., favorable or unfavorable) is the amount of issue-relevant knowledge. Under the ELM, knowledge affects one's ability to process the information in a message. The more knowledgeable recipients are about an issue, the more they are able to (1) counterargue messages that oppose their initial position (producing more unfavorable attitudes) (Tesser and Shaffer 1990; Wood 1982) and (2) pro-argue (bolster) attitude-congruent messages (generating more favorable attitudes) (Lord et al. 1979). According to the ELM, however, people will only use their issue-relevant knowledge to process message arguments if they are motivated to do so (Petty and Cacioppo 1986). For example, where motivation is low, issue-relevant knowledge will not produce counter- or pro-arguing.

Message Content

It has been argued that the most serious neglect in attitude change research has been with the content of the message (Fishbein and Ajzen 1981; Petty and Cacioppo 1986). The ELM proposes that under conditions of high elaboration, attitudes will be affected primarily by the strength of the arguments contained in the message. Specifically, strong arguments should produce more favorable attitudes than weak arguments when elaboration is high. Under low elaboration, attitudes are influenced mainly by peripheral cues.

The interaction of argument strength with both personal relevance and prior knowledge has not been examined in the literature. Yet, in order to develop persuasive messages about EM, it is important to understand the effects of manipulating one message variable on the other. For example, do strong arguments produce more favorable attitudes for high (versus low) knowledge subjects and/or when the message contains high (versus low) personal relevance? By understanding the interactive effects of message characteristics on attitudes toward EM, natural resource managers can design messages that target specific groups of individuals, such as those with low or high knowledge, etc.

Objectives of Study

The purpose of the study was to examine ways of generating favorable attitudes toward EM through the use of persuasive communication techniques. The first objective compares the effect of the FS message with ELM-generated messages on changing public attitudes toward EM. The second objective examines the interaction among personal relevance, prior knowledge, and argument strength on attitudes toward EM.

Methods

Sampling

Eight hundred and five rural resident households in the Chattooga River Basin (CRB) were randomly chosen to participate in a telephone survey. The CRB consists of 120,000 acres of national forests and communities in three counties within Georgia, North Carolina, and South Carolina. Once the telephone area prefixes for the CRB were identified, households were determined using the random digit dialing method. Subjects were selected by asking for the adult living in the household with the most recent birthday.

All participants in the study were randomly assigned to one of six groups: a high personal relevance message containing strong arguments about EM; a low personal relevance/strong argument message; a high personal relevance/weak argument message; a low personal relevant/weak argument message; the FS message about EM (Williams 1994); and a "no message" group.

Procedure

Telephone interviews were conducted by trained personnel at the Survey Research Center (SRC) on the campus of a large southeast university. Twenty-five interviewers (15 female) were used. To ensure consistency across interviewers, each interviewer (1) was trained in techniques of standardized interviewing procedures (such as reading questions exactly as worded, using neutral probes when appropriate, and following standard procedures for responding to requests by respondents for explanations); (2) was briefed on the purpose of the EM study; (3) conducted mock interviews with other interviewers; and (4) was routinely monitored by an SRC supervisor. Most of the interviewers had more than 2 years of experience with the SRC.

On average, interviews took approximately 12 min to complete. Respondents were informed at the onset of the telephone interview that the survey was to elicit public opinions about management of our national forests and that they had been randomly selected to participate. Questions and the messages were read in the same order by the interviewers to the respondents; only when requested by the respondent would the interviewer reread any part of the questions and messages.

Measurement of Variables

Personal Relevance of EM. Consistent with approaches by Petty and Cacioppo (1981a, 1981b, 1986, 1990) and Petty et al. (1983), high personal relevance was induced using a message in which subjects were informed that an FS policy of EM would be implemented in their local area (the Chattooga River Basin). Recipients of the low personal relevance message were informed that the EM policy was to be administered in the Pacific Northwest region of the United States.

Knowledge of EM. Knowledge was measured using six questions (see Table 1) developed from FS literature on EM (e.g., U.S. Forest Service 1993a, 1993b, 1993c, 1993d, 1993e). Each question had a "true/false/don't know" response scale and was asked prior to administration of the message. High and low knowledge groups were created using the number of correct responses to the six knowledge questions. Subjects who scored above (below) the sample mean for the six knowledge items were placed in the high (low)

knowledge group. These two groups were termed "highest knowledge" and "lowest knowledge," respectively.[1]

Argument Strength. Strong and weak arguments were developed using a five-phase modification of the "thought-listing procedure" (Cacioppo et al. 1981; Cacioppo and Petty 1981). In Phase 1, a pilot test, 40 randomly selected residents in the CRB were asked to identify "the advantages and disadvantages of their supporting EM." EM was described as follows:

> As part of a national policy change, the FS is shifting to EM. Under EM, the FS will emphasize the health, stability and diversity of national forests. The FS will still provide products and services, such as timber and recreation, but if the health, stability and diversity of the forest is threatened, the provision of products and services may be reduced until they do not result in damage to the forests.

This statement was developed in conjunction with FS personnel. From the pilot test, and from information obtained from FS publications (U.S. Forest Service 1993a, 1993b, 1993c, 1993d, 1993e), a list of 16 arguments in support of EM was generated.

In Phase 2, a second group of subjects (senior level undergraduate students from a natural resource policy class) ranked these statements from most persuasive to least persuasive in terms of generating support for EM. All students were familiar with EM from class lectures and readings. The four most persuasive and four least persuasive arguments were incorporated into two separate message statements.

In Phase 3, the two messages were administered to a third group of subjects (senior level undergraduate students in a natural resource recreation class), who were given 3 min to "write down (their) general thoughts on the topic of EM after reading the message." Their responses were coded into three groups (favorable, unfavorable, or neutral).

Phases 4 and 5 involved checks of reliability and validity. In Phase 4, the numbers of favorable, unfavorable, and neutral responses for each group were compared. We found that the strong argument message elicited mainly favorable thoughts (i.e., 79.1% of the responses were favorable toward EM), while the weak argument message evoked slightly more unfavorable thoughts (36.5%) than favorable (32.7%) or neutral comments (30.8%). According to Cacioppo et al. (1981), to the extent that strong (weak) messages elicit favorable (unfavorable) thoughts, the messages may be considered reliable measures. In the final phase, FS and university specialists rated the two messages for their overall believability. The intent was to develop messages that contained strong and weak, but not unbelievable, arguments.

The four strong arguments (as developed from the five-phase thought-listing procedure) read: "EM is aimed at improving the long-term health and conservation of our national forests," "EM ensures the preservation of threatened and endangered species," "EM will improve the habitat for fish and wildlife," and "EM means that the national forests will be preserved for future generations." The four weak arguments were: "EM is aimed at reducing the conflict between loggers and environmentalists," "EM will increase tourism opportunities for local communities," "EM will promote the cultural heritage of the national forests," and "EM will lead to short-term reductions in timber harvesting on national forests."

Attitudes

Attitudes toward EM were measured using 6 modal salient beliefs previously determined from an elicitation study of 30 randomly selected residents in the CRB. These were that

EM will (1) improve the quality of recreation opportunities on national forests, (2) reduce the amount of timber harvesting on national forests, (3) help conserve natural resources on national forests, (4) help preserve threatened and endangered species on national forests, (5) reduce the number of timber-related jobs on national forests, and (6) increase the cost of timber on national forests. For each belief the outcome was rated on a 7-point "extremely agree" to "extremely disagree" scale, coded from +3 to –3, respectively. In addition, each outcome was evaluated on a 7-point "extremely good" to "extremely bad" scale, also coded from +3 to –3, respectively. Consistent with the theory of reasoned action (Fishbein and Ajzen 1975, 1981), scores on each belief and its corresponding evaluation were multiplied to arrive at a total of six belief × evaluation scores (called "individual attitude items"). Scores from each of the individual attitude items (which could range from +9 to –9) were summed to create an "overall" attitude score (ranging from +54 to –54).

Messages

The four ELM-generated messages consisted of (1) either high or low personal relevance and (2) either the four strong or four weak arguments.

Analysis

Objective 1 was tested using a multivariate analysis of variance (MANOVA). A three-way MANOVA was used to test objective 2. All analyses were conducted with SPSS/PC+ version 4.0 (Norusis 1991) and a significance level of $p < .05$. The least significant difference method (the default approach in SPSS/PC+) was used to test for significant differences among paired groups.

Results

Five hundred and two interviews were completed, 29 were partially completed, and 274 people refused to participate in the survey. This yielded a response rate of 62.4%. Two outliers were removed from the study. These subjects had responded with a distinct pattern of extreme values to questions on the survey.

Issue-Relevant Knowledge

Table 1 shows that, with the exception of the questions on clearcutting and wildlife species, only one-third (or less) of the respondents correctly answered each item. For the three items dealing with eliminating clear-cuts, damage from timber harvesting, and mining and grazing on national forests, almost one-half of the respondents reported that they "did not know" the correct answer. The mean correct score for all six items was 2.2. Simple random selection of the three responses (true, false, don't know) would yield a mean correct score of 2.0. There were no significant differences between the six message groups on knowledge scores, suggesting that prior to receiving the message the six groups were equally knowledgeable about EM.

Objective 1

Table 2 shows mean scores (and sample sizes) for the six individual attitude items and the overall attitude scale by the six message groups. Sample sizes were relatively even across the groups (ranging from $n = 73$ to $n = 88$).

Table 1
Percentage of responses to items concerning knowledge of ecosystem management

Item	Correct response	Percent indicating		
		True	False	Don't know
EM will eliminate all clear-cuts in National Forests.	False	18	34	47
Clearcutting is a harvest method in which all trees are removed from the site at the same time.	True	66	16	18
EM will be implemented only on areas that have been severely damaged by timber harvesting.	False	23	28	49
Species such as the northern spotted owl and the red-cockaded woodpecker are indicators of the long-term health of the forest.	True	53	19	28
EM will attempt to return lands back to their original (pre-Columbian) condition.	False	52	17	31
Under EM, mining and grazing will no longer be permitted on National Forests.	False	30	26	44

Generally, as personal relevance and/or argument strength decreased, attitudes became less favorable. Significant differences between groups were found for the overall attitude scale and three of the individual attitude items: "EM will improve the quality of recreation opportunities on national forests," "EM will help conserve natural resources on national forests," and "EM will help preserve threatened and endangered species on national forests." In all four instances the control group produced a significantly lower mean score than messages that contained either strong arguments and/or high personal relevance. For the overall attitude scale, there was no significant difference between the low personal relevance/weak argument message group and the control. There were no significant differences between the ELM and FS messages.

Objective 2

A significant three-way interaction of argument strength by personal relevance by knowledge for the overall attitude measure was found ($F = 3.6$; $p < .05$). Table 3 shows that under the lowest levels of knowledge, argument quality had a significant effect on high but not low levels of personal relevance, while under low argument strength, increasing personal relevance led to a more unfavorable attitude toward EM.

Under higher levels of issue-relevant knowledge, an almost opposite effect was found: Argument quality had a greater effect on low than on high levels of personal relevance (i.e., for messages containing strong arguments, increasing personal relevance of

Table 2
Mean scores on the overall attitude scale and individual attitude items by message type

	Mean score by message type							
	High rel./ strong arg. (n = 86)	Low rel./ strong arg. (n = 85)	High rel./ weak arg. (n = 86)	Low rel./ weak arg. (n = 73)	FS message (n = 88)	No message (n = 82)	F	p
Overall attitude[c]	14.21[b]	14.18[b]	12.60[b]	11.16[a,b]	12.00[b]	6.58[a]	3.13	.01
Improve recreation[d]	2.97[b]	3.54[b]	3.41[b]	2.90[b]	2.93[b]	1.53[a]	3.21	.01
Reduce harvesting[d]	2.27	2.45	2.67	1.80	1.59	1.13	1.70	.13
Conserve resources[d]	4.50[b]	4.92[b]	4.12[b]	3.94[a,b]	4.10[a,b]	2.95[a]	2.38	.04
Preserve species[d]	4.18[b]	4.51[b]	3.92[b]	4.05[b]	3.92[b]	2.60[a]	2.21	.05
Reduce jobs[d]	−0.14	−1.14	−0.88	−1.30	−0.23	−0.62	1.06	.38
Increase costs[d]	−0.05	−0.23	−0.67	−0.05	−0.19	−1.02	0.71	.61

Note. Overall attitude scores do not equal the sum of the individual attitude items because of nonresponses to certain questions. Rel., relevance; arg., argument.

[a,b] Significant differences between group means ($p < .05$). For example, group mean scores with an *a* superscript differ significantly from group means with a *b* superscript.

[c] Range of scores for the overall attitude scale is +54 to −54.

[d] Range of scores for the individual attitude items is +9 to −9.

EM led to a slightly less favorable attitude), while under low argument strength, increasing personal relevance led to a more favorable attitude toward EM.

Discussion

The purpose of this study was to examine ways of generating more favorable attitudes toward EM through persuasive communication techniques. Results showed that although CRB residents have generally positive attitudes toward EM, (1) these attitudes are based on low knowledge of EM and (2) messages can be developed that significantly improve attitudes toward EM.

There were no significant differences between the effects of ELM-generated and FS messages on attitudes. However, consistent with the tenets of ELM, messages that contained strong arguments and/or high personal relevance produced the most favorable attitudes toward EM. Including strong arguments may be more important than ensuring the message is personally relevant.

The significant three-way interaction of argument strength, personal relevance, and knowledge is partially supported by the ELM. When the EM issue was of low relevance under the lowest knowledge condition, the strength of the arguments had little effect on attitudes, since there may have been little motivation to elaborate on the information. For high relevance under the lowest knowledge condition, the strong arguments resulted in more positive attitudes than did weak arguments.

For the group with the highest levels of knowledge, however, the argument strength by personal relevance interaction that would be proposed by the ELM was not obtained.

Table 3
Mean overall attitude scores of the interaction between knowledge, personal relevance, and argument strength

	Weak arguments		Strong arguments	
	Mean	*n*	Mean	*n*
Lowest knowledge				
Low personal relevance	13.7	37	13.7	52
High personal relevance	10.5	54	14.4	49
Highest knowledge				
Low personal relevance	8.4	34	15.0	29
High personal relevance	16.5	29	14.0	33

Weak arguments resulted in more favorable attitudes than did strong arguments for the high personal relevance condition. There are at least three reasons for this. First, for the higher knowledge group, there was little difference between the attitudes of the low relevance/strong argument condition and the high relevance/strong argument condition. The ELM suggests that for issues of high relevance, there would be greater motivation to elaborate on information. As a result, receiving strong arguments for a highly relevant issue should result in more positive attitudes toward that issue than for an issue of low relevance. However, it is conceivable that as knowledge about an issue increases, so does "need for cognition" for that issue, a factor that Petty and Cacioppo (1986) suggest increases motivation to elaborate on information. More knowledgeable individuals in the strong arguments group may have all had higher needs for cognition and therefore elaborated more on the strong arguments provided them, regardless of whether the issue was personally relevant or not. As a result, little difference in attitudes between the low and high relevance groups would be expected.

Second, for the higher knowledge group, individuals in the low relevance/strong argument condition had more positive attitudes than those in the low relevance/weak argument condition. The ELM suggests that for issues of low relevance, strong arguments would have the same effect on attitudes as weak arguments, since under low relevance there is little motivation to elaborate on any arguments, strong or weak. However, if more knowledgeable individuals did indeed have a greater need for cognition, then the comparative effects of strong versus weak arguments about EM under the low relevance condition, in this study, might have been expected.

Finally, for individuals with higher levels of knowledge there was a relatively small difference between those receiving strong versus weak arguments in the high relevance group. According to the ELM, it would be expected that individuals in the high relevance/strong argument condition would have more positive attitudes than individuals in the high relevance/weak argument condition. However, independent of argument strength, it may be argued that individuals with higher levels of knowledge about and high personal relevance to EM are the most committed. According to Tesser (1978), individuals organize their beliefs about an issue in a consistent or correlated manner, resulting in more extreme attitudes. In a later study, Millar and Tesser (1986) found that the more committed an individual is to an issue, the more likely it is that that individual will be able to correlate his or her beliefs and, as a result, take more extreme attitudes. In this

study, the most committed individuals would be most likely to associate new knowledge with their existing knowledge structure and, as a result, may have more extreme attitudes, whether they received strong or weak arguments.

Theoretical Implications

While some findings in this study were supported by the theoretical tenets of the ELM, others were not. Specifically, the proposed argument strength by personal relevance interaction for individuals with relatively high levels of knowledge about EM was not supported. One explanation for this discrepancy is that an individual's need for cognition, untested in our study, may have mediated the roles that personal relevance and knowledge play in the effects of information on attitudes.

The ELM posits several factors that may influence an individual's motivation and/or ability to elaborate upon information about natural resource issues. One way of categorizing these factors might be as variables that (1) are inherent in the individual (such as need for cognition, distraction, and mood), (2) represent the association between the individual and the issue (including personal relevance, knowledge, and personal responsibility, or (3) relate directly to the message itself (such as message repetition and message comprehensibility). Given that the need for cognition may have potentially mediated the effects of issue related factors such as relevance and knowledge, it is conceivable that this categorization of factors may, to some extent, explain the relative concurrent effects of factors proposed by the ELM to influence message-relevant thinking.

Managerial Implications

Applied implications of this study center on how managers may use these findings to develop communication strategies about a particular natural resource issue. One implication focuses on the need of managers to understand their target audience. With EM, key questions include whether or not the audience considers EM as highly relevant, or whether the audience is generally knowledgeable about what EM entails. Knowing the answers to these questions will help managers understand the effect an information campaign may have on the attitudes of their target audience. For example, although rural residents in the CRB may be ill informed about EM, this lack of knowledge may not be inhibitive in generating favorable attitudes if messages are developed that contain strong arguments. In contrast, knowledge may be a critical factor with messages that are highly relevant but are perceived to contain weak arguments.

A second implication focuses on whether managers can manipulate the characteristics of the audience in order to increase elaboration of a message. For example, in addition to understanding the extent to which the target audience perceives a natural resource issue as relevant, managers should consider the strategy of including not only facts and figures about an issue, but also information that would attempt to increase the perceived relevance of the issue to the target audience. Doing so would increase the likelihood that elaboration of their message would increase, and therefore would produce more enduring attitude change.

In summary, it is reasonable to expect that a goal of any information campaign is to have enduring effects on the attitudes and behaviors of the public for which that campaign is targeted. To do so, the public should be encouraged to elaborate on that information and be influenced in the way intended by the information. Managers should develop

information that (1) provides strong arguments for the strategy being proposed, (2) emphasizes how the particular management issue is relevant to the target audience, and (3) provides additional information to those people who may already possess some knowledge about the issue.

Limitations

At least three limitations to the study should be noted. First, only a 62% response rate was obtained. No follow-up tests were conducted and no questions were asked of CRB residents who were contacted on the phone but who refused to participate in the study. Previous studies have shown that nonrespondents are typically less involved with the topic or issue addressed by the survey (e.g., Fisher 1996; Heberlein and Baumgartner 1978; Tarrant et al. 1993), suggesting that for this study, nonrespondents might have exhibited even lower levels of knowledge than survey respondents. To demonstrate the possible quantitative effect of a 38% nonresponse on results of our study, we calculated upper and lower bounds to the data collected. Bounds were determined by assuming that all nonrespondents ($n = 247$) answered (1) the knowledge questions either correctly or incorrectly and (2) the attitudinal questions using either the high pole or the low pole of the Likert scale. Although results indicate a wide variance of response, suggesting that a 38% nonresponse can affect the data, it is unlikely that the bounds would have occurred in reality; nevertheless, they provide theoretical limitations to the data.[2]

A second limitation concerns the use of students, FS employees, and university experts to rate arguments. While a random sample of CRB residents was used to generate an initial list of 16 arguments in support of EM, CRB residents were not used to rate the persuasiveness or the credibility of the ELM messages. Cacioppo et al. (1981) recommend using both independent expert judges and a sample of potential respondents to rate responses. We were unable to involve both groups in all five stages of the procedure and instead opted to use one group for each phase. Clearly this presents a bias in that the messages may not have been perceived as being as believable or credible by the CRB sample as by the "experts." We were, however, able to ensure that the messages contained arguments that (1) CRB residents did perceive as being either weak or strong (although not necessarily the strongest or the weakest of the initial 16 that were generated) and (2) were valid as perceived by experts.

A third limitation is the extent to which central processing actually occurred. In our study we indirectly manipulated central processing by varying argument strength and personal relevance. According to the ELM, when individuals are motivated and able to process message arguments, elaboration is more likely to occur. We did not, however, take an independent measure of central processing. One way in which this could have been accomplished would have been to measure the amount of time respondents actually thought about the messages presented.

Future Research

Several lines of research are suggested by this study. First, while the ELM proposes that high personal relevance and knowledge lead to greater elaboration of an issue, only the effects of potential elaboration was assessed in this study. Future research should examine the actual levels of elaboration that respondents go through when they receive information about a natural resource issue, given varying amounts of knowledge and issue rel-

evance. Second, the ELM suggests that elaboration of a message is necessary for enduring attitude change. While the ELM's proposed effects of personal relevance and argument strength on attitudes were supported, the enduring nature of those effects was not tested. Future research on this topic should examine attitudes toward natural resource management issues over time in order to assess this important aspect of the ELM. Third, future studies should examine differences between the targeted audience's (or public's) perceptions of argument strength and that of the resource manager, the individual who may be developing the message. Finally, the population in this study was limited to rural households in the CRB. Examination of the effects of communication strategies about natural resource issues should be expanded to determine if differences exist across rural and urban groups.

Notes

1. Consistent with other studies (e.g., Kellert and Berry 1987; Tarrant et al. 1997) suggesting the general public is poorly informed about natural resource issues, respondents in our study also demonstrated low knowledge scores. As a result, knowledge groups in this study may be more accurately represented using the terms "lowest" and "highest." This should not, however, affect predictions of the ELM, since higher knowledge individuals should still react differently to information than lower knowledge people (though, arguably, not to the same extent than would individuals with high knowledge).

2. For example, by assuming that all nonrespondents answered the knowledge questions incorrectly, the mean correct response to the six items ranged from only 11% to 43%, while under the assumption that all nonrespondents answered the same questions correctly, the mean correct knowledge score ranged from 46% to 78%. This compares with the actual mean correct knowledge score (based on 500 respondents), which ranged from 17% to 53%. A similar pattern of findings was also exhibited for the mean attitudinal scores; that is, overall attitude scores for the six message conditions ranged from –9.56 to 28.08 (high relevance/strong arguments), –9.69 to 27.95 (low relevance/strong arguments), –10.61 to 27.03 (high relevance/weak arguments), –12.65 to 24.99 (low relevance/weak arguments), –10.82 to 26.82 (FS message), and –14.73 to 22.91 (control group). Refer to Table 2 for a comparison with actual mean attitudinal scores based on 500 respondents.

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