INFLUENCING PUBLIC ATTITUDES TOWARD FOREST MANAGEMENT IN ALBERTA: AN EXAMPLE FROM TOURS OF THE SUNPINE FOREST PRODUCTS MILLS AND WOODLANDS

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ABSTRACT

In an effort to influence public attitudes toward forest management, some forest companies have undertaken initiatives to inform the public of their activities and of the science involved in forest management. This study is an evaluation of the effectiveness of one of these initiatives: public tours of a company's mills and woodland operations. Sunpine Forest Products Ltd. of Sundre, Alberta, initiated a study in 2000 to determine if information and firsthand experience of forestry operations could influence public attitudes. A survey was administered during public tours in a before-and-after design. Although knowledge levels were greater among those who completed the survey after the tour, no substantive attitudinal differences were observed. Tour participants, who were primarily from communities near the Sunpine operations, were older and less educated than the general public of Alberta. Tour participants also had more favorable attitudes toward forest management than the general public. The results suggest that the tours attracted a limited segment of the public who had relatively positive views of forest management before participating.

RÉSUMÉ

Afin de sensibiliser le public sur les activités qui concernent la gestion forestiPre, certaines compagnies forestiPres ont mis sur pied des campagnes d'information sur leurs activités et sur les aspects scientifiques de la gestion forestiPre. Cette étude fait une évaluation de l'efficacité de l'une de ces initiatives consistant en visites guidées des usines et des opérations forestiPres de la Sunpine Forest Products Ltd, de Sundre (Alberta). Entreprise en l'an 2000, cette étude visait B déterminer si l'information fournie et le fait de voir des activités forestiPres *in situ* avaient une influence sur l'opinion qu'a le public sur les entreprises forestiPres. Un sondage a été fait avant et aprPs chaque visite, mais si les connaissances étaient plus élevées chez ceux qui avaient répondu au sondage aprPs la visite, aucun changement substantiel d'opinion n'a été observé. Les participants, qui venaient principalement des collectivités voisines de la Sunpine, étaient plus âgés et moins instruits que le public albertain en général. Ils avaient également une opinion plus favorable des pratiques de gestion forestiPre que le public en général. Ces résultats indique que les visites guidées attirent un segment de population relativement restreint, qui a une opinion relativement positive de la gestion forestiPre avant mLme de participer B ce genre d'activité.

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The exclusion of certain manufactured products does not necessarily imply disapproval nor does the mention of other products necessarily imply endorsement by Natural Resources Canada.

INTRODUCTION

The Alberta public generally has an unfavorable view of the sustainability of forest management in the province (McFarlane and Boxall 2000a). Timber supply, managing for multiple benefits, and public involvement are cornerstones in the paradigm of sustainable forest management. The public, however, believes that timber supply and multiple benefits are not being given adequate consideration and that the public does not have enough say in forest management. Furthermore, the Alberta public is not very well informed about forest management: compared with environmentalists, registered professional foresters, and members of forest-industry public advisory groups, the public rated themselves the least informed and scored the lowest on true-or-false questions related to forest management (McFarlane and Boxall 2000a). To rectify this information deficiency, with an ultimate goal of improving public perceptions, some forest companies have undertaken initiatives to inform the public of their activities and of the science involved in forest management.

The types of educational initiatives undertaken by the forest industry in Alberta include a variety of activities such as performance reports on the sustainability of forest management practices, company web sites, classroom visits, and tours of mills and woodland operations (information obtained through personal communication with personnel at Weldwood of Canada Limited, Hinton Division; Daishowa-Marubeni International Ltd.; Canfor; and Millar Western). Some companies have regularly scheduled mill tours for the public, whereas others conduct such tours on request. Tours of woodland operations are usually conducted only on request and are often presented for interest groups or student and teacher groups.

During summer 2000, Sunpine Forest Products Ltd. (a company based in Sundre, Alta.) conducted tours of its mills and woodland operations to help improve the public's understanding of the company, its importance in terms of the regional economy, and its forest management practices. The goal of these tours was to offer participants an enjoyable experience, to convey information about the company's mills and forest management in the Sunpine Forest Management Agreement (FMA) area, and ultimately, to promote a positive assessment of forest management and to change public perceptions of the sustainability of forest management.

The objective of this study was to evaluate the effectiveness of the educational tours in improving knowledge of forest management and in changing attitudes related to forest management.

Elements of Persuasive Communication

Whenever individuals engage in communication to sway public opinion, they are engaging in persuasive communication. The basic tenet of persuasive communication is that information will lead to a change in knowledge, attitudes, and behavior. Although this study did not evaluate long-term changes, we used the Elaboration Likelihood Model of persuasion (ELM) as a basis for understanding the influence of knowledge on attitudes and behavior. The following summary is based on a review of ELM by Petty et al. (1992).

The attitude construct is central to persuasive communication because attitudes (e.g., attitudes toward forest management) may be important mediating variables between the acquisition of knowledge (e.g., facts on forest management) and behavioral change (e.g., desisting from actions that interfere with forestry operations). In this study we were interested only in the knowledge–attitude relationship. Attitudes represent a person's general predisposition to evaluate people, objects, or issues favorably or unfavorably. Although research concerning the effect of knowledge acquisition on attitudes is not conclusive, some studies suggest a link between the two. For example, Bright and Manfredo (1997) found that exposure to information about the management of old-growth forests did not change the direction of attitudes (e.g., from agreement to disagreement) but did affect the strength with which attitudes were held. Cable et al. (1987) found that interpretive messages about forest management in Canada and the Canadian Forest Service had a positive effect on visitor attitudes about forest management and the agency. Young (1980) found that providing information about wilderness, especially to those with low levels of knowledge, resulted in more favorable attitudes toward the wilderness concept. Fortner and Lyon (1985) found that a single exposure to a television program on environmental issues resulted in short-term attitudinal change in the desired direction, but the change did not persist.

As these studies suggest, the relationship between knowledge and attitudinal change is complex. A person must first be exposed to the information and must then attend to the information presented, which must enter long-term memory (reception) if the changes are to be lasting. Even when new information has been learned, there is no guarantee that this learning will result in the desired attitudinal change. Attitudinal change depends on how the information is evaluated and interpreted. Information can be interpreted as favorable, unfavorable, or neutral, or it may not produce any cognitive (thoughts) or affective (feelings) response. The more favorable the cognitive or affective response, the more likely that attitudes will change in a positive direction; conversely, the more negative the response, the more likely that attitudes will change in a negative direction.

Once thoughts and feelings have been integrated into an overall evaluation of the attitude object (integration), then attitudinal change can occur. However, the causal sequence from knowledge to attitudes is not inevitable. The acquisition of new knowledge can occur without a subsequent attitude change, and attitudes may change even if the person has not learned the information being communicated.

Factors such as credibility of the information source, motivation of the individual, personal relevance of the issue, and context may also influence attitudes. If a person's motivation to process the information is low, then other cues such as the credibility of the information source will have a greater influence on attitudes. Attitudinal change evoked by external cues such as credibility is referred to as the peripheral route to persuasion. Attitudes formed by this route are generally not long lasting and are easily changed. When messages are complex, personal relevance of the information is low, and there are many distractions, people are more likely to evaluate the information on the basis of external cues.

Individuals who are motivated to attend to, process, and evaluate the information tend to form attitudes that become integrated into their belief structure. Attitudes formed in this manner are persistent and difficult to change. Attitudinal change involving the integration of knowledge into a person's belief structure is referred to as the central route to persuasion.

METHODS

The Company

Sunpine Forest Products Ltd., established in 1987, is a medium-sized integrated forest products company wholly owned by Weldwood of Canada Limited. Sunpine's main office is in Sundre, Alberta (about 113 km northwest of Calgary). The company has two processing plants. The first, a sawmill with wood-treating and post-manufacturing facilities, is located in Sundre. The second, located near Strachan (about 20 km southwest of Rocky Mountain House), is an innovative continuous laminated-veneer lumber plant. Sunpine is the first forest company in Alberta to be registered under both the International Organization for Standardization ISO 14001 standard and the Canadian Standards Association (CSA) certification standard. Both of these certification processes evaluate forest companies in terms of their environmental practices and principles of sustainable forest management.

Sunpine Forest Products Ltd. has an FMA with the provincial government to harvest wood from the western part of the province. The Sunpine FMA area consists of 507 000 ha of public land situated along the eastern slopes of the Canadian Rocky Mountains in western Alberta (Fig. 1).

The Public Tours

Sunpine Forest Products Ltd. conducted public tours of its two mills and woodland operations during summer 2000. To solicit participation, the tours were advertised in local newspapers, on local radio stations, and at the tourism centres in Rocky Mountain House (RMH) and Sundre. Notices were also posted at campgrounds in provincial recreation areas in the FMA area.

The tours were conducted on Monday and Friday afternoons from 7 July to 1 September 2000. Monday tours were conducted at the Sundre site and Friday tours at the RMH site. Each tour (total duration approximately 4 h) consisted of a slide presentation, a tour of one of Sunpine's two mills, and a tour of the woodland operation in the

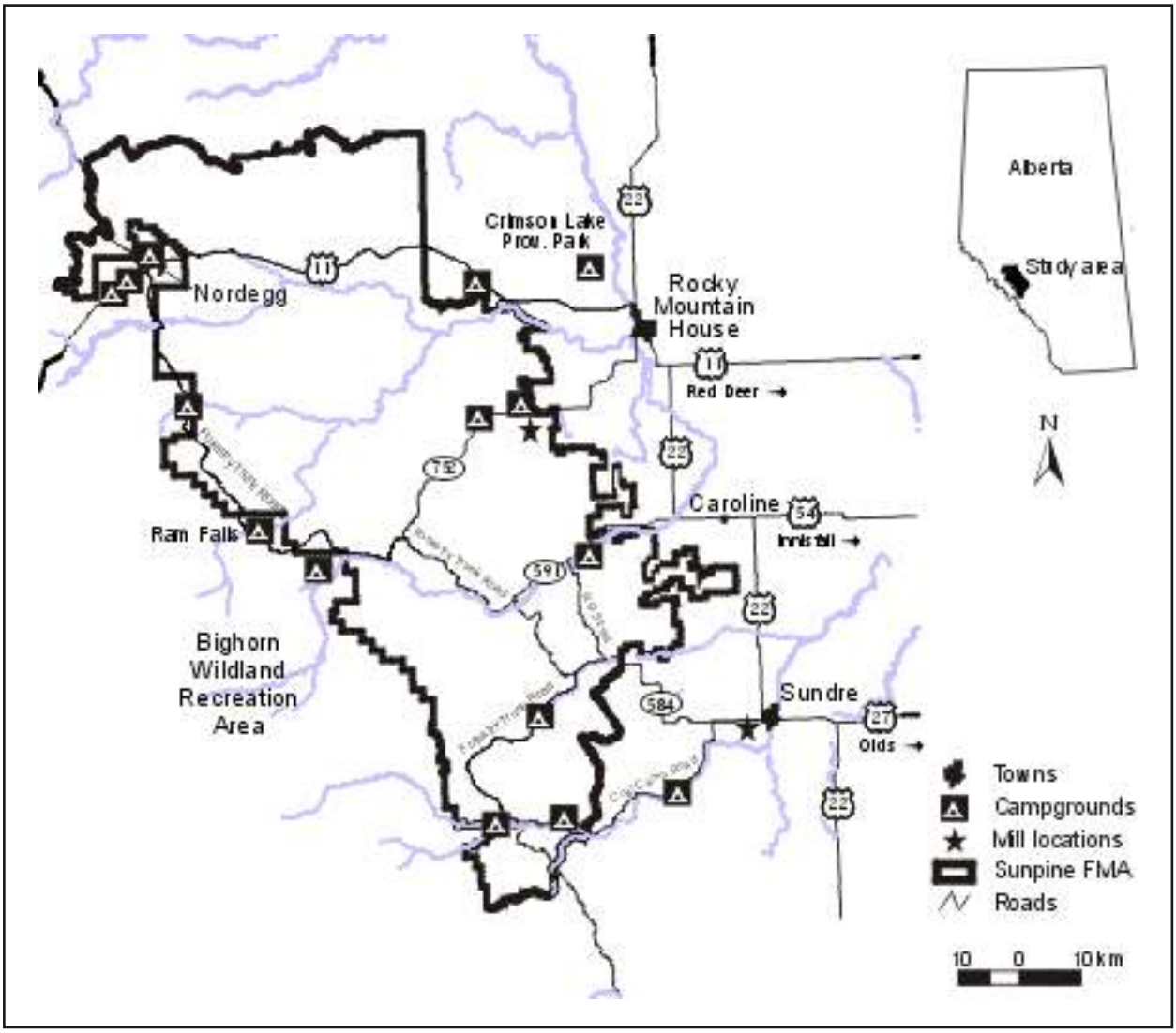

Figure 1. Location of the Sunpine Forest Products Ltd. Forest Management Agreement area (courtesy of Sunpine Forest Products Ltd.).

Sunpine FMA area. The slide show and woodland operation components of the tours presented messages related to sustainable forest management practices. The messages included information on planning the timber harvest, harvesting methods (e.g., clear-cutting), rules and regulations set out in legislation, watershed protection, regeneration efforts in harvested areas, the role of fire in forests, the role of research in forest practices, and the changes that have occurred in forest management, such as the shift from an emphasis on sustained timber yield to an emphasis on sustaining the environmental, social, and economic values associated with the forest. An outline of the presentation appears in Appendix 1. To help establish credibility for the information being presented, Sunpine Forest Products Ltd. contracted with FEESA, a non-profit environmental education organization, to conduct the tours. The same guide conducted all tours throughout the study period.

Participants on the RMH tour visited the laminated-veneer lumber mill in Strachan and woodland operations in the Strachan–RMH area. Those on the Sundre tour visited the sawmill at Sundre and woodland operations in the Sundre area. Although different tours were offered at the two sites, the key messages presented were generally the same. On the woodland portion of the tour

a van shuttled participants to pre-determined sites in the Sunpine FMA. The guide provided information en route and once at the stop-sites participants disembarked from the van to experience firsthand the messages being conveyed.

The Survey

A survey was designed to assess value orientation, attitudes toward forest management and clear-cut logging, knowledge of clear-cut logging, and demographic characteristics of tour participants. Many of the value orientation and attitudinal questions had been used in previous studies of forest stakeholder groups in Alberta (e.g., McFarlane and Boxall 2000a). Value orientation statements were designed to assess degree of biocentric or anthropocentric orientation toward forests. Attitudes toward forest management assessed evaluations about the sustainability of forest management in Alberta and about clear-cut logging. Many of the attitudinal statements related to the messages conveyed during the tours. For example, the tours included messages that forests are managed for a variety of benefits such as wildlife habitat, recreation, and timber. Attitudinal statements such as "Forests are being managed successfully for a wide range of uses and values, not just timber" and "Forest management does a good job at including environmental concerns" were designed to capture attitudes toward the sustainability of multiple forest values. Messages on clear-cut logging covered the design of clear-cuts to mimic natural disturbance patterns such as fire, regeneration of clear-cut areas, and the benefits to some wildlife. Corresponding attitudinal statements included "Clear-cut logging mimics what occurs naturally in the forest," "Most clear-cut areas must be replanted in order for the forest to regrow," and "Many species of wildlife benefit from clear-cut logging."

Participants rated value and attitudinal statements on a five-point scale ranging from strongly disagree (1) to strongly agree (5). Participants were also offered a "no-opinion" category, which was recoded as 3 (neither agree nor disagree) in the calculation of means. For a complete description of the value and attitude methodology, see McFarlane and Boxall (2000a). Participants were also asked how they felt, overall, about clear-cutting as a forest harvesting method in Alberta. Participants rated their responses on a five-point scale ranging from strongly opposed to strongly in favor. A "no-opinion" category was also available.

In the only measure of knowledge in the study, participants were asked to rate themselves on how well informed they were about clear-cut logging in Alberta, using a four-point scale ranging from not at all informed to very well informed. A "not-sure" category was also included.

A before-and-after study design was used. Some tour groups completed the survey before receiving any information from the tour guide, and the other groups completed the survey after the tour, during the drive back to the tour's starting point. The sampling alternated, so that at each site, the survey was administered before the tour one week and after the tour the next week. For example, if the survey was administered before the tour on the first Monday, it was administered after the tour on the second Monday. Only people 18 years of age or older were asked to complete the survey. A total of 101 eligible respondents participated in the tours. Of these, 66 completed a survey: 25 during an RMH tour and 41 during a Sundre tour. Thirty-two surveys were completed before a tour and 34 after a tour.

To determine if tour participants differed from the Alberta population in terms of value orientation and attitudes toward forest management, data from a general population survey of Alberta were included in the analysis. These data were collected by mail survey in 1999. Details of the earlier study can be found in McFarlane and Boxall (2000a).

RESULTS

The results are presented in two sections: an overview of the characteristics, value orientation, attitudes, and knowledge of the participants and a comparison of those surveyed before and after the tour, to assess differences in attitudes and knowledge between these two groups.

Overview of Tour Participants

Characteristics of Participants

Most of the respondents were from Alberta (58 of 64 [91%]). Two were from the United States (one each from Florida and Texas), two from Saskatchewan, and one each from Manitoba and Ontario. Thirty-four of the 58 Albertans were from the local communities of RMH and Sundre (Table 1). The remaining respondents were primarily from other communities near the Sunpine FMA such as Caroline, Red Deer, Olds, and Ponoka.

Participants were mostly senior citizens with an average age of 59.9 yr (range 31 to 84 yr).

Only 4 (6%) of 65 respondents had a university degree, and none had obtained a graduate university degree (Table 2).

How Participants Learned About the Tour

The most common source of information about the tour was the newspaper, which accounted for 41% (26 of 64) of respondents, followed by the tourist information centres at RMH and Sundre, which accounted for 34% (22 of 64). Word-of-mouth was the information source for 23% (15 of 64). None of the participants had heard about the tours on the radio. One person reported another source not listed on the survey.

Value Orientation

In the forestry context, value orientation reflects an individual's general beliefs about forests and has been defined as relatively enduring conceptions of the good related to forests and forest ecosystems (Bengston 1994). As such, value orientation relates to abstract concepts of forests rather than specific beliefs about forest management and is therefore more difficult to change than specific beliefs. We did not expect that the single exposure to the information presented during the Sunpine tour would influence an individual's value orientation. However, it is important to understand stakeholders' value orientation because it provides a foundation for attitude formation and management preferences (Bourke and Luloff 1994; Steel et al. 1994; Tarrant et al. 1997; Vaske and Donnelly 1999; McFarlane and Boxall 2000b).

Table 1. Place of residence for tour participants from Alberta who completed the survey

City or town	% (and no.) of participants
Sundre	42 (24)
Rocky Mountain House	18 (10)
Calgary	14 (8)
Olds	7 (4)
Caroline	4 (2)
Devon	4 (2)
Red Deer	4 (2)
Bearberry	2 (1)
Bowden	2 (1)
Bragg Creek	2 (1)
Ponoka	2 (1)
Lacombe	2 (1)

Note: One Alberta resident did not indicate a city or town.

Table 2. Level of educational attainment

Level of education	Tour participants % (and no.)	Alberta population[a] % (and no.)
Grade 9 or less	9 (6)	7 (45)
Some high school	12 (8)	12 (78)
High school graduate	25 (16)	19 (129)
Technical school or community college	26 (17)	31 (208)
Some university	22 (14)	12 (77)
University degree (bachelor's)	6 (4)	13 (84)
Some graduate study	0 (0)	3 (21)
Graduate university degree	0 (0)	4 (28)

[a] Data from McFarlane and Boxall (2000a).

In forest management, value orientation has been described as falling along an anthropocentric–biocentric continuum (Steel et al. 1994; Vaske and Donnelly 1999). An anthropocentric orientation reflects the general belief that the value of forests relates primarily to the benefits they can provide to humans. This represents a utilitarian view of the good of forests. A biocentric orientation reflects the general belief that forests have intrinsic value and should be valued for their own sake, regardless of their usefulness to humans. Included within the biocentric orientation are the concepts of the rights of nature and the spiritual benefits of forests.

Tour participants were in agreement with only two of the five anthropocentric value orientation statements (Table 3). Most tour participants agreed or strongly agreed that "forests should be managed to meet as many human needs as possible" (78%) and that "forests can be improved through management by humans" (77%). However, only a minority of participants believed that "forests should exist mainly to serve human needs" (15%), that "forests that are not used for the benefit of humans are a waste of our natural resources" (21%), and that "the primary function of forests should be for products and services that are useful to humans" (31%).

Most participants agreed with all but two of the biocentric value orientation statements. About one-third agreed or strongly agreed that forests should have the right to exist for their own sake. Only 15% agreed or strongly agreed that forests should be left to grow and develop without being managed by humans. There was strong agreement on statements reflecting spiritual benefits of forests: that forests "give us a sense of peace and well-being" (90%), "let us feel close to nature" (77%), and "rejuvenate the human spirit" (87%).

In summary, participants could be described as believing that forests are a resource to be utilized and managed but not exclusively to serve human

Table 3. Distribution of ratings for value orientation statements

Value orientation statement	Ratings; % (and no.) of respondents[a]					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	No opinion
Anthropocentric						
Forests should be managed to meet as many human needs as possible	2 (1)	9 (6)	8 (5)	50 (32)	28 (18)	3 (2)
Forests should exist mainly to serve human needs	11 (7)	58 (36)	15 (9)	15 (9)	0 (0)	2 (1)
Forests that are not used for the benefit of humans are a waste of our natural resources	22 (13)	49 (29)	8 (5)	14 (8)	7 (4)	0 (0)
The primary function of forests should be for products and services that are useful to humans	6 (4)	44 (28)	19 (12)	28 (18)	3 (2)	0 (0)
Forests can be improved through management by humans	0 (0)	5 (3)	16 (10)	60 (38)	17 (11)	2 (1)
Biocentric						
Forests should have the right to exist for their own sake, regardless of human concerns and uses	10 (6)	28 (17)	27 (16)	23 (14)	10 (6)	2 (1)
Forests give us a sense of peace and well-being	2 (1)	3 (2)	5 (3)	41 (26)	49 (31)	0 (0)
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans	8 (5)	65 (41)	13 (8)	13 (8)	2 (1)	0 (0)
Humans should have more respect and admiration for the forests	0 (0)	2 (1)	11 (7)	44 (29)	44 (29)	0 (0)
Forests let us feel close to nature	0 (0)	5 (3)	16 (10)	60 (38)	17 (11)	2 (1)
Forests rejuvenate the human spirit	0 (0)	0 (0)	11 (7)	48 (30)	39 (24)	2 (1)

[a] Not all tour participants rated all statements; therefore, the total number of respondents for each statement is variable.

needs. They recognized the spiritual aspects of forests but did not view forests as having a right to exist for their own sake.

Attitudes toward Forest Management

Participants did not give sustainable forest management in Alberta a glowing endorsement (Table 4). Although most agreed or strongly agreed that "forests are being managed successfully for a wide range of uses and values" (63%) and that "forest management does a good job at including environmental concerns" (60%), they did not agree with other statements reflecting sustainable forest management. For the remaining attitudinal statements, there was a more even distribution between agreement and disagreement (Table 4).

Although many participants seemed unconvinced that forest management in Alberta is meeting several of the requirements for sustainability, a large proportion rated their attitude toward forest management as neutral or they had no opinion (which indicates that they neither agreed nor disagreed with the statements). This finding suggests that participants' attitudes regarding the sustainability of forest management may not have been well formed.

Attitudes toward Clear-cut Logging

The practice of clear-cut logging is often a controversial topic among the public. Many forest managers believe that this controversy is the result of a misunderstanding of the benefits of the method and the science used in its design. Information provided on the Sunpine tours addressed many of the concerns often associated with clear-cut logging (Appendix 1). Messages covered several aspects of clear-cutting, from the planning stages of when and where to cut to regeneration after harvest. For example, messages were presented about designing clear-cuts to mimic natural disturbances such as fire, the benefits of clear-cuts to some species of wildlife, silvicultural activities to enhance regeneration, and watershed protection. Participants saw firsthand both natural and planted regenerating stands in various stages of

Table 4. Distribution of ratings for statements about attitudes toward forests

Attitudinal statement	Ratings; % (and no.) of respondents[a]					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	No opinion
Forests are being managed successfully for a wide range of uses and values, not just timber	0 (0)	8 (5)	26 (16)	58 (36)	5 (3)	3 (2)
Forest management does a good job at including environmental concerns	0 (0)	7 (4)	28 (17)	57 (34)	3 (2)	5 (3)
Alberta has enough protected areas such as provincial and national parks or wilderness areas	6 (4)	28 (18)	26 (17)	34 (22)	3 (2)	3 (2)
Forests are being managed successfully for the benefit of future generations	0 (0)	13 (8)	37 (22)	35 (21)	5 (3)	10 (6)
Forestry practices generally produce few long-term negative effects on the environment	5 (3)	20 (12)	39 (18)	35 (21)	2 (1)	8 (5)
The present rate of logging is too great to sustain our forests in the future	3 (2)	24 (14)	24 (14)	29 (17)	5 (3)	14 (8)
There will be sufficient wood in Alberta to meet our future needs	2 (1)	23 (14)	27 (17)	29 (18)	6 (4)	13 (8)
Enough harvested trees are being replaced by planting new ones or by natural seeding to meet our future timber needs	2 (1)	21 (13)	21 (13)	38 (23)	2 (1)	16 (10)
The forest industry controls too much of Alberta's forests	2 (1)	20 (12)	46 (27)	15 (9)	8 (5)	8 (5)
The economic benefits from forestry usually outweigh any negative consequences	7 (4)	27 (16)	25 (15)	27 (16)	8 (5)	7 (4)

[a] Not all tour participants rated all statements; therefore, the total number of respondents for each statement is variable.

growth, as well as recent clear-cuts, and received explanations of the science behind some of the techniques and some of the benefits associated with clear-cutting, such as the creation of wildlife habitat.

Examination of participants' attitudes toward clear-cutting suggests that many of these attitudes were not well formed (i.e., many participants rated their attitude as neutral or they had no opinion; Table 5). Participants who gave other ratings, however, can generally be described as having positive attitudes toward clear-cut logging. For example, a majority of the respondents agreed with three of the six positive statements: "Clear-cut logging prevents the waste of trees" (52%), "The kinds of trees that are planted . . . are usually native" (78%), and "Clear-cutting is the most economically efficient harvest method" (55%). Similarly, for only one negative statement did a majority of participants (80%) agree ("Most clear-cut areas must be replanted in order for the forest to regrow").

Participants were about equally divided in terms of their overall attitude to clear-cutting: 25% were opposed or strongly opposed, 27% were neutral, and 28% were in favor or strongly in favor; 20% were undecided.

Knowledge of Clear-cut Logging

Most participants rated themselves as somewhat informed (40 of 65 [62%]) or very well informed (4 of 65 [6%]) about clear-cut logging. Ten of 65 participants (15%) rated themselves as somewhat not informed, and 8 of 65 (12%) rated themselves as not at all informed. Three participants (5%) were not sure about their level of knowledge.

Comparison of Participants Surveyed Before and After the Tour

No substantive differences were observed between participants surveyed before the tour and those surveyed after, which suggests that the

Table 5. Distribution of ratings for statements about clear-cut logging

Attitudinal statement	Ratings; % (and no.) of respondents[a]					
	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	No opinion
Positive						
Clear-cut logging prevents the waste of trees that would normally be lost to forest fires	5 (3)	16 (9)	19 (11)	47 (27)	5 (3)	7 (4)
Many species of wildlife benefit from clear-cut logging	4 (2)	34 (19)	20 (11)	30 (17)	2 (1)	11 (6)
The kinds of trees that are planted after clear-cutting are usually native to the area	0 (0)	5 (3)	12 (7)	62 (36)	16 (9)	5 (3)
In the long run, clear-cut logging generally produces few negative effects on the forest	3 (2)	16 (9)	31 (18)	40 (23)	2 (1)	9 (5)
Clear-cut logging is the most economically efficient harvest method	0 (0)	4 (2)	27 (15)	48 (27)	7 (4)	14 (8)
Clear-cut logging mimics what occurs naturally in the forest	14 (8)	14 (8)	32 (18)	25 (14)	0 (0)	16 (9)
Negative						
Clear-cut logging prevents the natural processes of the forest from occurring	5 (3)	22 (13)	25 (15)	31 (18)	3 (2)	14 (8)
Clear-cutting poses a risk to Alberta's old-growth forests	2 (1)	41 (24)	19 (11)	25 (15)	5 (3)	8 (5)
Most clear-cut areas must be replanted in order for the forest to regrow	0 (0)	9 (5)	9 (5)	55 (31)	25 (14)	2 (1)
Clear-cut logging leaves a permanent visual scar on the landscape	2 (1)	49 (29)	14 (8)	17 (10)	12 (7)	7 (4)
Clear-cut logging usually causes forest soils to erode	0 (0)	21 (12)	26 (15)	43 (25)	3 (2)	7 (4)

[a] Not all tour participants rated all statements; therefore, the total number of respondents for each statement is variable.

respondents shared common value orientations and attitudes. There were no significant differences for the value orientation statements (Table 6), one significant difference for an attitudinal statement about forests (Table 7), and one significant difference for an attitudinal statement about clear-cut logging (Table 8). In addition, the two groups did not differ in their overall assessment of clear-cut logging. The lack of differences in value orientation supported our hypothesis that value orientation would not change as a result of the tour (see "Value Orientation," above).

Attitudes are easier to change, and differences between the before and after groups were therefore expected. However, the results suggest that the tours did not effect any substantive change in attitudes. Attitude change is a complex process influenced by many factors, of which knowledge is one, and the tours were therefore intended to improve participants' understanding of forestry practices. The tours did seem to influence how well informed participants felt about clear-cut logging: among participants surveyed before the tour, the mean rating of knowledge was 2.21, but among those surveyed after the tour, mean self-rating was 3.00 (t-value !4.45, $p < 0.0001$). Therefore, it appears the tours increased knowledge but did not lead to any substantive change in attitudes.

The lack of attitudinal change might have been the result of several factors related to the tour itself. However, it might also have been the result of the participants' characteristics. Perhaps the tours attracted individuals who were more sympathetic to forest management than most of the general

Table 6. Comparisons of value orientation statements between tour participants surveyed before and after the tour and between all tour participants and the Alberta population

	Mean rating[a]			
	Tour participants		This study versus Alberta survey	
Value orientation statement	Before tour	After tour	Tour participants	Alberta population[b]
Anthropocentric				
Forests should be managed to meet as many human needs as possible	4.00	3.88	3.94	3.49*
Forests should exist mainly to serve human needs	2.36	2.32	2.34	2.06
Forests that are not used for the benefit of humans are a waste of our natural resources	2.46	2.23	2.34	1.72**
The primary function of forests should be for products and services that are useful to humans	2.87	2.71	2.78	2.15**
Forests can be improved through management by humans	3.86	3.94	3.90	3.92
Biocentric				
Forests should have the right to exist for their own sake, regardless of human concerns and uses	2.69	3.19	2.95	3.92**
Forests give us a sense of peace and well-being	4.30	4.36	4.33	4.62*
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans	2.43	2.27	2.35	2.81**
Humans should have more respect and admiration for the forests	4.22	4.38	4.30	4.63**
Forests let us feel close to nature	3.86	3.94	3.90	4.64**
Forests rejuvenate the human spirit	4.20	4.31	4.26	4.21

[a] Rated on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree.

[b] Data from McFarlane and Boxall (2000a).

* Tour participant mean differs significantly from Alberta population mean (t-test $p < 0.05$).

** Tour participant mean differs significantly from Alberta population mean (t-test $p < 0.01$).

public. If so, then it could be expected that exposure to the information presented on the tour would not result in any substantive change in attitudes.

To test if the tours had attracted individuals who differed from the general population, the results from this study were compared with those from a survey of the Alberta population. The latter survey was conducted by mail with a random sample of Albertans in 1999 (McFarlane and Boxall 2000a). It included the same questions on demographic characteristics, value orientation, and attitudes toward forest management as the survey for the Sunpine tours.

Tour participants were considerably older (mean age 59.9 yr) than the public (mean age 45.8 yr), and they had less education (Table 2). In particular, only 6% of tour participants had a university degree, whereas 20% of the public had at least a bachelor's degree.

The tour participants seemed more anthropocentric and less biocentric in their value orientation than the Alberta public (Table 6). The tour participants had significantly higher mean scores (indicating greater agreement) on most of the anthropocentric statements and significantly lower mean scores (indicating less agreement) on all but one of the biocentric statements than the general public.

In terms of attitudes toward forest management, tour participants had a more favorable view of the sustainability of forest management in the province than the public (Table 7). For example, the tour participants had greater agreement with the statements "Forest management does a good job at including environmental concerns" and "Forests

Table 7. Comparisons of attitudes toward forests between tour participants surveyed before and after the tour and between all tour participants and the Alberta population

	Mean rating[a]			
	Tour participants		This study versus Alberta survey	
Attitudinal statement	Before tour	After tour	Tour participants	Alberta population[b]
Forests are being managed successfully for a wide range of uses and values, not just timber	3.46	3.71	3.60	3.36
Forest management does a good job at including environmental concerns	3.31	3.81*	3.57	3.20**
Alberta has enough protected areas such as provincial and national parks or wilderness areas	3.13	2.88	3.00	2.70
Forests are being managed successfully for the benefit of future generations	3.31	3.32	3.32	2.78**
Forestry practices generally produce few long-term negative effects on the environment	2.96	3.18	3.08	2.26**
The present rate of logging is too great to sustain our forests in the future	3.04	3.12	3.09	3.71**
There will be sufficient wood in Alberta to meet our future needs	3.21	3.12	3.16	2.61**
Enough harvested trees are being replaced by planting new ones or by natural seeding to meet our future timber needs	3.04	3.26	3.16	2.76**
The forest industry controls too much of Alberta's forests	2.88	3.24	3.08	3.46***
The economic benefits from forestry usually outweigh any negative consequences	3.04	3.03	3.03	2.27**

[a] Rated on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree.

[b] Data from McFarlane and Boxall (2000a).

* After tour participant mean differs significantly from before tour participant mean (*t*-test $p < 0.01$).

** Tour participant mean differs significantly from Alberta population mean (*t*-test $p < 0.01$).

*** Tour participant mean differs significantly from Alberta population mean (*t*-test $p < 0.05$).

are being managed successfully for the benefit of future generations" than the public. On the other hand, the public had greater agreement with the statements "The forest industry controls too much of Alberta's forests" and "The present rate of logging is too great to sustain our forests in the future."

DISCUSSION

For several of the attitudinal statements, many of the tour participants gave a neutral or "no-opinion" rating, which suggests that they did not have well-formed attitudes. Individuals whose attitudes are not well formed are more likely to change than those who are in strong agreement or disagreement with an issue (Tesser and Leone 1977). Thus, the potential existed for attitudinal change among tour participants, but the tours did not seem to influence attitudes toward forest management or clear-cut logging.

Several factors identified in the ELM could affect attitudinal change, including knowledge about the attitude object, motivation to attend to the information, and credibility of the information source. In this study the level of knowledge appeared to be greater among the participants surveyed after the tour than among those surveyed before, but differences in attitudes were not evident. These results are consistent with previous studies in Alberta that have suggested that high levels of knowledge do not necessarily translate into favorable attitudes toward forest management. For example, environmentalists are among the most knowledgeable stakeholders but have unfavorable views of the sustainability of forest management in the province (McFarlane and Boxall 2000a). Effective persuasive communication is a complex process that requires an understand-

Table 8. Attitudes toward clear-cutting among tour participants surveyed before and after the tour

Attitudinal statement	Mean rating[a]		
	Before tour	After tour	All participants
Clear-cut logging prevents the waste of trees that would normally be lost to forest fires	3.08	3.50	3.32
Most clear-cut areas must be replanted in order for the forest to grow	3.88	4.03	3.96
The kinds of trees that are planted after clear-cutting are usually native to the area	3.48	4.23*	3.88
Clear-cut logging leaves a permanent visual scar on the landscape	2.93	2.84	2.88
In the long run, clear-cut logging generally produces few negative effects on the forest	3.23	3.19	3.21
Clear-cut logging is the most economically efficient harvest method	3.64	3.55	3.59
Clear-cut logging prevents the natural processes of the forest from occurring	3.11	3.00	3.05
Clear-cut logging mimics what occurs naturally in the forest	2.62	3.00	2.82
Clear-cutting poses a risk to Alberta's old-growth forests	2.93	2.90	2.92
Many species of wildlife benefit from clear-cut logging	2.92	2.94	2.93
Clear-cut logging usually causes forest soils to erode	3.33	3.26	3.29

[a] Rated on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree.

* Significantly different at $p < 0.01$ (*t*-test).

ing of factors other than initial attitudes and knowledge levels, such as the most effective media source, motivations of the audience, perceived credibility of the information source, and personal relevance of forest management. The complex nature of persuasive communication and the fact that this study did not examine many of the possible factors influencing attitudes makes it difficult to identify why no substantive differences in attitude were observed between the two groups. However, the results do provide insight into some possible reasons.

First, the differences between tour participants and the general public suggest that the tours might not have reached the segment of the population with unfavorable views of forest management. In other words, the tours attracted individuals with more favorable attitudes than the general public, and the presentations were therefore "preaching to the converted." The tours also appear to have attracted a limited demographic segment of the Alberta population—older, less educated, and living nearby. This could be the result of the focus on advertising the tours locally. However, even if the tours had been advertised more broadly, it is unlikely that Albertans with unfavorable views of forest management would have participated. Those who view forest management as being unsustainable are unlikely to perceive the forest industry or anyone representing the views of the industry as a credible source of information (Parkins et al. 2001).

Second, motivation to learn might not have been a reason for respondents participating in the tours. If participants are highly motivated to pay attention and learn new information, there is greater likelihood of attitude change. Although people's reasons for attending the tours were not explored in this study, observations by the tour guide suggest that many of the participants were not attending the tours to acquire new information. Rather, they viewed the tours as something different to do and an opportunity to spend some time in areas of the forest where they had never been. Attending to new information might have been secondary to simply enjoying the outing.

Finally, the study design might have been inadequate to detect differences in attitudes. This study represents a first attempt at understanding the effectiveness of Alberta forest industry tours in influencing the public's views of forest management. As such, it was conducted with as little disruption of the tours as possible and was designed to ensure that participants had an enjoyable experience and to minimize survey response burden. To confirm these results future tours should be designed for the specific purpose of research. Such a design could include more objective knowledge measures and follow-up surveys administered several months to a year after the tours to determine if there are long-lasting changes in knowledge and attitudes. Many messages were communicated during the tours, but we assessed only self-rated knowledge of clear-cut logging. Clearly, more objective and rigorous knowledge measures might show more differences between participants surveyed before and after the tour. In addition, the small samples in the two groups are a potential source of error in the current study. Larger samples are needed to confirm the results.

To improve success in swaying public opinion, some forest companies and industry associations attempt to target their communication and public education efforts to members of the public who hold neutral attitudes, in the belief that these people are more likely to be influenced and educated than those who hold either strongly negative or strongly positive attitudes (A. Jones, Weldwood of Canada Limited, Hinton Division, personal communication, E-mail, August 29, 2002). However, many Albertans have strong opinions about forest management and they are not favorable (McFarlane and Boxall 2000a). In addition, many participants in this study had neutral attitudes, but there was no evidence of any substantive attitudinal change after the tour. This suggests that targeting individuals with neutral attitudes may not be achieving the desired goal of swaying public opinion. Whether the lack of an observable difference between participants surveyed before and after the tour is a testament to failure of the tours to achieve their desired effect or is attributable to study design is a question that requires further research. To gain a better understanding of the factors influencing the public's perceptions of forest management and how to improve communications to effect attitude change, it will be necessary to conduct more rigorous studies. For example, experiments in communication methods and firsthand experience with forestry practices involving a broader range of participants might shed more light on the phenomenon of attitude change related to industrial forest management. Comparisons with other mediums, such as written materials, interactive displays, videos, and experimenting with a variety of communicators, such as university scientists and

spokespersons from industry, government, and environmental organizations are worthy of future consideration.

Although most forest companies in Alberta have not used regularly scheduled mill and woodland tours to inform the public of sustainable forest management practices, this study has implications for public education initiatives in general. Companies must target their intended audience. Attracting primarily local residents with neutral or positive views on forest management will do little to sway public opinion. In addition, this study and others (e.g., McFarlane and Boxall 2000a) suggest that increasing knowledge may not translate into favorable views of forest management. Therefore, attending to the many complex factors involved in persuasive communication may be more effective in achieving communication goals.

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APPENDIX 1
Outline for Sunpine Forest Products Ltd. tour presentation

Introduction and Overview

- Welcome to the tour
- Who am I?
  - Presenter's background in forestry and education
  - Work for FEESA, an environmental education society
  - Balanced approach to education: trying to present as many different perspectives as possible on each issue
- Why are we here?
  - Interested in learning about Alberta's forests
  - Trying to learn more about the ecology of our forests (Why are they here? How did they get here? What impact have we, as humans, had on these forests? How do we use the forest? How are we changing our thinking to better manage the forest?)
  - Benefit of a partnership with Sunpine Forest Products Ltd., which is allowing us to tour its mill and visit its woodlands
- Schedule for the day
  - Slide show
  - Drive to the mill for a mill tour
  - Drive to various woodlands sites around Rocky Mountain House or Sundre

Slide Show

- What is forestry?
  - Managing the forest to ensure that it remains forever
  - A circular system that begins with planning what is to be done within the forested area, including preharvest planning (areas to harvest; areas to leave, especially for wildlife habitat; areas for recreation) and planning how certain areas of the forest can be harvested (if at all—certain stands may be deleted from the eligible land base); then moves to using the trees in a mill to produce a product (pulp, paper, lumber, newsprint, plywood, laminated veneer lumber), selling that product, and, very importantly, regenerating areas of the forest (naturally, naturally with help, or by planting) and monitoring the trees as they grow (surveys at various times throughout the early life of the stand to ensure trees are growing as they should) so that the cycle may begin again
- The forest as it was (before major human activity)
  - Fire came through about every 80 to 100 years, resulting in a variable pattern of heavily burned areas (with occasional standing dead snag trees left behind), moderately burned areas (with some trees remaining damaged but alive and others dead), and untouched areas (e.g., around marshy areas, some depressions, water spots).
  - New stands grew up, with fireweed and other colonizing species becoming established first, lodgepole pine and aspen next, followed by spruce and balsam fir in the understory.
  - Alberta has very little "old growth" forest as is found on the British Columbia coast; here, a tree older than 120 years could in some respects be considered "old growth."
  - Eastern slopes of the Canadian Rocky Mountains contained various types of vegetation, from grassy meadows and rock outcrops to dense forests of pine (and sometimes spruce)
  - There was a balance of species (with cycles of increasing and decreasing population size).
- Early forestry
  - In the early to mid-1900s, people thought of the timber supply as endless: if they cut down one area of trees, there was always another area just over the hills.
  - By later decades of the 20th century, managers were beginning to manage the forests to promote animal species; at that time, it was mainly the economically important species (i.e., big game species for hunting, such as elk and moose) that were protected or managed for.

- By the 1980s, managers began to look further into the effects of humans on the environment and to engage in more environmentally sound practices (not an instant change and still going on today); the government was getting more involved in managing the forest effectively for the whole ecosystem rather than for the benefit of just a few.

- Modern forest managers

  Today, good forest managers have to look at more than just the trees—they need to look at how to manage the forest from many different perspectives:

  - Environmental (flora, fauna, water systems, etc.)
  - Social (values of society, recreation, esthetics)
  - Economic (products, jobs, competitiveness on a world market)

  Balancing these perspectives is not easy, and the economic side sometimes has a big pull and can overshadow the other two. However, forest managers are realizing that the public is much more interested in what is going on and more willing to investigate, so it is in their best interests to work with rather than against the public.

- How things are done currently

  - Legislative measures (http://www3.gov.ab.ca/srd/forests/)
  - Harvesting:
    - Timber harvest planning and operating ground rules
    - Alberta Environment manages the forest for sustainability, integrated use of resources, and a healthy environment in harmony with the needs of Albertans.
    - Sustained yield is the key, harvesting at a level that ensures we have forests into infinity.
    - Oldest and poorest-condition stands are given harvesting priority, with some mature and over-mature stands being left for wildlife or esthetic reasons.
    - Generally, a two-pass system is used (enter an area and harvest half of that area; once the regenerating stands are established, go back in to harvest the remainder). There is a possibility of three-pass or selective harvesting methods if these are most suitable for meeting certain management objectives.
    - More protection of understory (ground vegetation) is now typical, especially if valued for wildlife recreation, soil or watershed protection, etc.
    - Watershed protection can consist of buffers up to 100 m wide for lakes, 60 m for large permanent rivers and streams, 30 m for medium to intermittent rivers and streams, or slightly less (depending on the size of the watershed).
    - Abandoned roads are returned to original or near-original landform, drainage, and productivity.
    - A General Development Plan (5-year plan) is resubmitted annually, from which the Annual Operating Plan (1-year plan) is developed.
  - Regeneration:
    - Planting and regeneration procedures must be done within 2 years, and a restocking survey is done 4 to 8 years after harvesting (to look for acceptable established seedlings that are alive, healthy, undamaged, and of minimum height, and that have been growing on site for 3 years; also, acceptable advanced growth for trees that were established before the harvest).
    - Acceptable crop species are needed, i.e., species native to the specific area harvested, growing to the specific heights given in the regulations.
    - Eight to fourteen years after harvesting, performance surveys are carried out—trees must be free-to-grow (alive, healthy, undamaged, on site for 3 years, and 2 m from deciduous trees or any shrub taller than two-thirds its own height, and must meet the height requirement).
    - Wet sites can be harvested, as long as the feasibility of regeneration treatment has been demonstrated.
    - Forms are standardized across the province and include information on the type of block (drainage, type of timber [deciduous, coniferous], etc.).
  - Research:
    - Research has changed forest practices significantly.

- Many industry companies are entering into partnerships with universities (e.g., University of Alberta) and government (e.g., Canadian Forest Service, Northern Forestry Centre) to look into what is good about the way we do things and how we might improve practices in the future.
- Examples:
  - Moving from square, patchwork-quilt cut-block patterns to irregularly shaped blocks that mimic natural disturbance (e.g., fire)
  - Leaving patches or single trees of various sizes, similar to when fire passes through, to provide animal habitat, a seed source for other trees, etc.
  - When insects or diseases hit a stand in greater numbers than normal, using specific techniques to manage the effects (e.g., for dwarf mistletoe of pine: cut down the trees, establish a buffer of 30 m, and regenerate the stand to spruce, which is resistant to the disease)

- Harvesting process:
  - Trees are cut with a feller–buncher (fells and collects more than one tree, then lays them down for the delimber to pick up) or processor (fells, delimbs, cuts to length), then delimbed (if cut by feller–buncher), with debris left on ground or piled and burned.
  - Trees are skidded to a landing where they are loaded onto a truck to be hauled to the mill.
- Mill process:
  - Once the timber arrives at the mill, what happens to it?

Woodland Operations

- Sundre sites:
  - Example of disease
  - Older-succession forest
  - Regeneration sites
  - Evidence of multiple use—grazing lease, oil and gas roads
- Rocky Mountain House sites:
  - Regeneration
  - Regeneration after major wind event
  - Site preparation
  - Ram River bridge—environmental concerns
  - Evidence of multiple use—off-road vehicle use, oil and gas activity