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Bengston, David N.; Fan, David P. 1999.  
Roads on the U.S. national forests: an  
analysis of public attitudes, beliefs,  
and values expressed in the news media.  
*Environment and Behavior*. 31(4): 514-539.

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Reprinted from *Environment and Behavior*  
Volume 31, No. 4 July 1999, pp. 514-539  
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# ROADS ON THE U.S. NATIONAL FORESTS

## An Analysis of Public Attitudes, Beliefs, and Values Expressed in the News Media

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**ABSTRACT:** Public attitudes, beliefs, and underlying values about roads on the U.S. national forests expressed in more than 4,000 on-line news stories during a 3-year period are analyzed by using computer methods. The belief that forest roads provide access for recreation was expressed most frequently, accounting for about 40% of all beliefs expressed. The belief that roads cause ecological damage was the second-most prominent belief. The volume and nature of media debate about forest roads changed in the third quarter of 1997 due to narrowly defeated proposals in the U.S. House of Representatives and the U.S. Senate to make major cuts in spending on roads. During this quarter, the belief that road building on the national forests is a subsidy to the timber industry was expressed most frequently. Implications for developing a transportation policy for the national forests that more accurately reflects current social attitudes, beliefs, and values are discussed.

**Road construction and logging** on the U.S. national forests increased dramatically in the years following World War II. This increase came in response to a variety of factors, including rapid population growth and increased

demand for wood products, strong political support for raw material production and economic growth, and the dominance of the agricultural model of forest management among foresters (Hays, 1988; Hirt, 1994). Accelerated road construction was viewed as essential for meeting the nation's demand for wood during the booming postwar years. In 1951, the chief of the Forest Service lamented that "the national forests are still woefully deficient in suitable road mileage needed for maximum utilization and proper management of the timber" (USDA Forest Service, 1951, p. 51). At the same time, the boom in outdoor recreation after the war resulted in logging roads being used overwhelmingly for recreation activities that often conflicted with timber harvesting, and the rise of the modern environmental movement in the 1960s resulted in growing opposition to increased road building and logging. Thus, the stage was set decades ago for a showdown over roads on the national forests.

By 1996, the road system on the U.S. national forests had grown to almost 373,000 miles on 191 million acres of public land. About 23% of this road system consists of arterial or collector roads that serve all users, including passenger cars; 57% is made up of roads open for use by high-clearance vehicles such as four-wheel drives; and 20% of national forest roads are closed by gates.<sup>1</sup> The national forests contain an additional estimated 60,000 miles of "ghost roads"—unplanned and unmanaged roads that were created by repeated use but not intended to be a part of the forest road system. In 1996, 434 miles of new roads were constructed on the national forests, or about 0.1% of the total road system (Coghlan & Sowa, 1998).

Public use of this road system has changed in recent decades. During the past 10 years, timber harvesting on the national forests dropped from about 12 billion board feet annually to less than 4 billion board feet, whereas recreational use surged from less than 250 million recreation visitor days to almost 350 million (Coghlan & Sowa, 1998). Roads that were built mainly to facilitate timber harvesting now carry growing numbers of recreationists. Public debate about building new roads has intensified, leading to increasing administrative appeals and litigation. The intensity of the debate about road building reached a peak during the congressional appropriations process in 1997.

In response to changing use of and attitudes toward national forest roads, USDA Forest Service Chief Mike Dombeck announced a major overhaul of the forest road system in January 1998 (USDA Forest Service, 1998). New forest road management policies and regulations are being developed, based

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**AUTHORS' NOTE:** *The authors thank Ann Bartuska, Jim Caswell, Richard Forman, Thomas Mills, George Peterson, and two anonymous reviewers for helpful comments on an earlier version of this article.*

on public input and scientific understanding of the impacts of forest roads. In addition, an interim policy was proposed that would temporarily halt road construction in most areas of the national forest system that do not have roads at present.

A critical need in developing new road policies that are responsive to the changing social environment is a better understanding of people's attitudes, beliefs, and values related to forest roads, but very little past research has examined this area. Two recent surveys analyzed public attitudes toward forest roads. A nationwide survey of the public conducted by Frederick/Schneiders, Inc. (1994) for *American Forests* magazine included a question about attitudes toward road building in roadless areas of federal forests (this survey was summarized by Smith & Clark, 1994). In this survey, arguments on both sides of the issue were presented. Respondents were asked whether they agreed with "those who favor building more roads to increase access for fighting fires, to allow the forest to be thinned, and for recreational uses" or with "those who do not favor building roads because roads create soil erosion and destroy the wild nature of the forest." Building roads in federal forests where roads do not now exist was opposed by 55% to 40% (6% did not know or refused to answer).

Brunson, Shindler, and Schreckhise (1994) conducted a survey as part of the Interior Columbia Basin Ecosystem Management Project (the results of this survey are summarized in Quigley & Arbelbide, 1997). This survey compared three sample groups: Eastside Columbia River Basin public (residents of Basin counties east of the Cascades), Westside Columbia River Basin public, and public-involvement participants (people on the project mailing list or who had participated in public meetings).<sup>2</sup> A question was included on whether people supported road closures in ecologically sensitive areas where recreation occurs. More than half of the respondents supported road closures as a strategy to improve conditions on public lands: 52% of Eastside residents supported or strongly supported road closures, as did 60% of Westside residents and 63% of participants in public-involvement activities. Opposition to road closures was a minority view held by 27% of Eastside residents, 17% of Westside residents, and 26% of public-involvement participants.

Several studies have examined the relationship between roads and recreation—including a few studies focused on the national forests—and found that roads are an essential part of the recreational infrastructure (Cordell, Teasley, Super, Bergstrom, & McDonald, 1997) and that driving for pleasure is often an important recreational activity. For example, more than half of the recreationists using roaded, multiple-use areas surveyed by Clark, Koch, Hogans, Christensen, and Hendee (1984) indicated that simply driving on forest roads was a primary recreational activity. Other studies have shown

that different types of recreationists have a wide range of preferences with respect to roads, that is, some prefer to recreate in areas on or near roads, whereas for others these are the least desirable areas (e.g., Cordell et al., 1997; Lime, 1971; Nickerson, 1998). Clark et al. (1984) found ambivalence about the desirability of new roads that would increase opportunities for dispersed, motorized recreation even among recreationists using roaded areas: "Users indicate that opening new areas for such recreation is a good reason for building new roads, but they do not want more roads in the areas they visit" (p. 36).

The purpose of this study is to increase understanding of evolving social attitudes toward roads and beliefs about roads on the national forests and to indirectly assess the broad social values underlying these attitudes and beliefs. Our analysis focuses on general attitudes and beliefs rather than the specific policy questions currently facing the Forest Service (i.e., under what circumstances should new roads be built or existing roads closed?). Computer methods were used to analyze more than 4,000 on-line news media stories from 78 newspapers and news wires dealing with roads on the U.S. national forests during a 3-year period ending in the third quarter of 1997. Because this approach to analyzing attitudes and beliefs is unfamiliar to many social scientists, the following section explains the rationale for, and efficacy of, analyzing the content of the news media as a means to indirectly measure public attitudes, beliefs, and values.

#### RATIONALE FOR ANALYZING THE NEWS MEDIA

Analysis of the media has repeatedly been shown to produce results that parallel the findings of attitude surveys and opinion polls. Most studies have shown that the media play an important role in influencing public attitudes and beliefs about various environmental issues (e.g., Brosius & Kepplinger, 1990; Gamson & Modigliani, 1989; Hoffman, 1996; Kepplinger & Roth, 1979; Noelle-Neumann, 1991; Parlour & Schatzow, 1978; Ranthum, 1996; Salwen, 1988) and a wide range of other social issues (e.g., Fan, 1988, 1994b, 1997; Fan & Holway, 1994; Hauss, 1993; Lindenmann, 1983), although there is a minority opposing view (Gooch, 1996; Gunter & Wober, 1983; Wober & Gunter, 1985). Related studies have found that the news media also influence agenda setting for environmental issues, that is, there is a relationship between the relative emphasis given by the media to environmental issues and the degree of salience these topics have for either the general public (e.g., Ader, 1995; Anderson, 1997; Atwater, Salwen, & Anderson, 1985) or the political agenda (e.g., Downs, 1973; Protess et al., 1987; Schoenfeld, Meier, & Griffin, 1979; Solesbury, 1976).

There are two reasons for the influence of the media on public attitudes and beliefs. First, natural resource and environmental issues are debated in a variety of forums in society. Social debates about natural resources and the environment take place in the courts, legislatures, meetings and hearings, demonstrations, and the media. The media play two important roles in these debates, serving as a direct forum for public discourse on natural resources (through editorials, letters to the editor, etc.) and reporting on debates occurring in all other forums. Pollster George Gallup theorized in 1939 that the media were creating a national town meeting in which issues were debated: "The newspapers and radio conduct the debate on national issues, presenting information and argument on both sides, just as the townsfolk did in person at the old town meeting" (quoted in Smith, 1997, p. 56). More recently, social theorist Jürgen Habermas has defined the term *public sphere* as a realm of social life in which citizens can come together as a rational body and discuss and debate issues of public concern, and in which public opinion can be formed. Habermas (1974) states that "today newspapers and magazines, radio and television are the media of the public sphere" (p. 49). Analysis of the content of the news media thus allows us to take the pulse of ongoing debates and discussions about natural resource issues, and thereby indirectly measure public attitudes and opinions.

Second, several studies have shown that the news media are the most important source of information about environmental issues for most people (e.g., Atwater et al., 1985; Fortner, Mayer, Brothers, & Lichtkoppler 1991; Ostman & Parker, 1987; Wilson, 1995). Shindler, Steel, and List (1996) found that the most important source of information about federal forest management for residents of Oregon's Central Cascades was newspapers, followed by television, radio, magazines/books, friends/relatives, interest groups, and natural resource agencies. Therefore, because the news media summarize ongoing social discussion and debates about natural resource and environmental issues and are the main source of information for the public about these issues, analysis of the news media is an efficient way to indirectly measure public attitudes, beliefs, and values related to natural resources.<sup>3</sup> This indirect measurement is supported by successful use of media coverage to predict percentage values of public opinion over time (e.g., Fan, 1997).

The following section describes the eight beliefs about roads on the national forests analyzed in this study and their relation to attitudes and values. This is followed by a description of the data and methodology, main results, and a discussion of the findings. A final section discusses conclusions and policy implications.

## ATTITUDES, BELIEFS, AND VALUES ABOUT ROADS: A FRAMEWORK FOR ANALYSIS

Figure 1 illustrates the relationship between favorable and unfavorable attitudes toward roads, beliefs that support these attitudes, and underlying forest values related to these attitudes and beliefs. An *attitude* is a learned predisposition toward some object as either favorable or unfavorable (Fishbein & Ajzen, 1975). The attitude object studied in this article is roads on the national forests. *Beliefs* reflect what people think is true about an object, and they are one reason for having a particular attitude toward the object. Both attitudes and beliefs are subject to change based on new information, persuasion, life experiences, and other learning processes. Figure 1 identifies eight beliefs about forest roads that were identified by examining several hundred randomly selected news media stories dealing with roads on the national forests during the past 3 years. These were the most frequently expressed beliefs about roads on the national forests, and most contain one or more subbeliefs. Four of the beliefs about forest roads that emerged from news media stories were arguments supporting favorable attitudes:

- *Recreational use and access:* Roads provide access for a wide range of recreational activities on the national forests; roads provide recreational access for people with disabilities and for senior citizens. It is important to note that including this belief as one supporting a favorable attitude toward forest roads does not imply that people holding this belief support additional road construction or oppose road closures. In fact, closed or abandoned roads are heavily used for recreational activities.
- *Commodity-related benefits:* Roads make possible the production of commodities that society needs (e.g., timber, cattle, minerals); roads are needed to provide access for small timber companies that are unable to pay for the full cost of roads.
- *Local community benefits:* Roads (and associated commodity production) generate a variety of benefits to communities in and around national forests, including commodity-related jobs, payments in lieu of taxes, strong and stable local economies, and subsistence uses of forests (e.g., gathering firewood).
- *Fire protection:* Roads provide access to backcountry areas for fire fighting, rescue activities, and various forest management activities (e.g., insect and disease control, thinning, tree planting).

The other four beliefs expressed in the news media and analyzed in this study were arguments supporting an unfavorable attitude toward roads on the national forests:

Attitudes	Favorable Attitude Toward Roads on National Forests					Unfavorable Attitude Toward Roads on National Forests						
Beliefs	<b>Recreational Use &amp; Access:</b> Roads provide access for recreational uses, including people with disabilities & senior citizens	<b>Commodity-Related Benefits:</b> Roads make possible production of commodities that society needs	<b>Local Community Benefits:</b> Roads generate benefits to local communities	<b>Fire Protection:</b> Roads provide access for fire protection & forest management activities	<b>Subsidy Costs:</b> Road building is a taxpayer-financed subsidy to the timber industry	<b>Ecological Costs:</b> Roads cause ecological damage such as erosion & habitat destruction	<b>Ecological Benefits of Roadless Areas:</b> Roadless areas provide ecological benefits such as clean water & wildlife habitat	<b>Roadless Recreation:</b> Roadless areas provide unique recreational opportunities	<b>Economic, Aesthetic, Moral/Spiritual Values</b>	<b>Economic/Utilitarian Values</b>	<b>Ecological Values</b>	<b>Economic, Aesthetic, Moral/Spiritual Values</b>
Values												

Figure 1: Attitudes, Beliefs, and Underlying Values Toward Roads on the National Forests Identified From News Media Stories

- *Subsidy costs:* Road building on national forests is a taxpayer-financed subsidy to the timber industry. This belief is usually expressed in the context of discussion of the purchaser credit program, in which timber companies are reimbursed for building logging roads through credits that reduce the cost of timber sales.
- *Ecological costs:* Roads cause significant ecological damage, such as erosion, siltation, destruction of wildlife habitat, and so on.
- *Ecological benefits of roadless areas:* Roadless areas provide various ecological benefits, such as clean water, high-quality wildlife habitat, ecological integrity, biological diversity, and so on.
- *Roadless recreation:* Roadless areas provide unique recreational, aesthetic, and spiritual experiences not obtainable in roaded areas; roadless areas also are associated with a high quality of life in a region, which attracts individuals and businesses to locate in the region.

Finally, the bottom row in Figure 1 identifies several broad forest values. Values have been defined in many ways by social scientists in different fields (Bengston, 1994). Forest values are defined in this study as broad and relatively enduring conceptions of what is good or desirable about forests. *Values* are the most deep-rooted and central elements in a person's system of attitudes and beliefs. Like attitudes and beliefs, individual and social values change over time, but they tend to be more stable and resistant to change.

This study focuses on measuring the salience of the eight beliefs about roads on the national forests as expressed in the news media. Analyzing beliefs about roads also sheds light on overarching attitudes and underlying values. For example, an expression in the news media of the belief that roads cause ecological damage (a) reflects an unfavorable attitude toward roads, (b) has a persuasive effect on attitudes toward roads held by the public, and (c) reflects the ecological value that ecosystem health and integrity are important. Therefore, directly analyzing beliefs concurrently illuminates related attitudes and values.

## METHODOLOGY AND DATA

This analysis involved four main steps: (a) downloading news media stories dealing with roads on the national forests from an on-line commercial database, (b) "filtering" the text to eliminate irrelevant paragraphs, (c) developing computer instructions to score the remaining paragraphs for the eight beliefs about roads discussed in the preceding section, and (d) assessing the validity or accuracy of the analysis. Each step is described below.



**Figure 2: Regional Breakdown Used in This Analysis: East (Forest Service Regions 8 and 9), InterWest (Forest Service Regions 1, 2, 3, and 4), and West (Forest Service Regions 5 and 6)**

NOTE: Forest Service Region 10 (Alaska) and Hawaii were not included due to a lack of news sources available on-line throughout the entire time period.

#### DOWNLOADING NEWS MEDIA STORIES

Data for this analysis consisted of news media stories discussing roads on the U.S. national forests during the 3-year period from October 1, 1994, through September 30, 1997. All stories were retrieved from the NEXIS on-line commercial database (Gongla-Coppinger, 1998), and the full texts were available from the NEXIS database for all news sources chosen for the analysis for the entire study period. All types of stories about national forest roads were included: straight news articles, opinion articles (editorials and letters to the editor), and articles from the sports/outdoors and travel sections. Separate analyses were made for national news sources and three regions of the United States: the East, InterWest, and West. Figure 2 shows the regional breakdown, which is based on aggregations of Forest Service administrative regions. The regional breakdown is based on place of publication rather than the geographic focus of a story.

The search command used to search NEXIS for text discussing roads and roadless issues on the national forests was (((forest service) or (national forest)) and (road! or unroad!)). The truncations "road!" and "unroad!" meant that any trailing letters did not matter. Therefore, the search found news media stories discussing roads, roadless areas, and unroaded areas. Using

this search command, we found 10,152 stories and retrieved a random sample of 10,000 stories for analysis:

National story sample:

- 619 stories from four national news wires and two national newspapers

Regional story samples:

- East (Forest Service Regions 8 and 9): 3,974 stories from 52 newspapers
- InterWest (Forest Service Regions 1, 2, 3, and 4): 2,711 stories from 10 newspapers
- West (Forest Service Regions 5 and 6): 2,696 stories from 9 newspapers

The average number of stories per newspaper was only 76 in the East, compared with 271 in the InterWest and 300 in the West. The greater media coverage in the western United States reflects the fact that most of the national forests are located in this part of the country.

#### FILTERING TEXT

The retrieved text was filtered using the InfoTrend computer software using the high-level Filtscor computer language (Fan, 1990, 1994a), which is described in the following step. The InfoTrend software can discard paragraphs that do not fit with user-specified criteria. Computer instructions were developed that discarded paragraphs that did not discuss roads on the national forests or only mentioned these topics incidentally. For example, paragraphs that mention "roadkill," "roadster," "middle of the road" policies, the "road not taken," the "end of the road," and so on were discarded. We did not filter out "repeat" news wire stories—the large number of stories analyzed and the small number of news wire stories made this unnecessary.

Filtering irrelevant stories from the text eliminated about 60% of the initial download of 10,000 stories (4,015 stories remained). Many of the discarded stories were ones in which the names of state or county roads were mentioned in the context of giving directions to activities or locations on national forests.

#### SCORING PARAGRAPHS

The unit of analysis in this study was individual paragraphs. Computer instructions were developed to score the remaining paragraphs for expressions of each of the eight concepts of interest, that is, to count the number of times each of the eight beliefs about roads on the national forests was

expressed in the national and regional databases of news media text. As with the filtering of text, scoring was done with the InfoTrend software using the Filtscor computer language. The Filtscor language has two components. One is a *dictionary* composed of a list of ideas important for the topic of interest and groups of words and phrases associated with each idea. The other component is a series of *idea transition rules* that specify how pairs of ideas are combined to give new meanings.

Developing the dictionaries and idea transition rules to capture expressions of beliefs about roads was an iterative process. In the development stage of the analysis, the coding decisions made by the still-evolving computer instructions are written to screen, and the analyst modifies the dictionaries and rules until computer coding of the text agrees with the analyst's interpretations at least 80% of the time. To illustrate the method, the following paragraphs explain the dictionaries and idea transition rules developed for identifying expressions of one of the eight categories of beliefs about roads (*Ecological Costs*).

The dictionary we developed to identify expressions of the belief that "roads cause ecological damage" contained five main ideas and groups of words and phrases associated with each idea:

1. *Objects of ecological value* (words and phrases that describe or connote ecological services and functions or other objects of ecological value, e.g., assimilative capacity, calving ground, keystone species, material cycling, migration route, nesting habitat, nesting trees, photosynthesis, storm abatement, topsoil, water quality, wildlife corridor, etc.);
2. *Ecological damage* (words and phrases that in the context of discussion of roads on national forests describe or connote undesirable ecological impacts, e.g., decimate, degraded, destructive, dwindling, eroded, extinction, fouled, fragmented, imperiled, impoverished, jeopardize, landslides, mudslides, overcutting, overfishing, overharvest, pollute, sedimentation, silted, unprotected, unraveling, wastelands, etc.);
3. *Ecological objects* (words and phrases that describe ecological or biological objects but do not by themselves imply that they are of value, e.g., alpine, aquatic, amphibians, animals, botanical, ecological, ecosystem, estuaries, fauna, flora, genetic, grasslands, grizzlies, habitat, landscape, mammals, migratory, native plants, riparian, species, watershed, wetlands, wildlife, etc.);
4. *Value* (words that connote the idea of value, e.g., benefits, valuable, value, and wealth); and
5. *Roadless* (words and phrases that refer to roadless areas, e.g., designated wilderness, no roads, roadless, unroaded, untouched, wilderness area, etc.).

The words in each of these groups were truncated where appropriate to include variations such as benefit, benefited, benefits, and so on.

Using these main ideas and word groups, we developed idea transition rules that specified how ideas associated with the groups of words were related to each other. For example, an idea transition rule specified that a paragraph in our text databases containing an *ecological objects* word within 50 characters of a *value* word be counted as one expression of the belief *Ecological Costs*. Another idea transition rule specified that a paragraph in which an *ecological objects* word appeared within 50 characters of an *ecological damage* word be counted as an expression of *Ecological Costs*. Paragraphs containing *objects of ecological value* words were directly coded as an expression of the belief *Ecological Costs*, because in the context of discussion of roads on the national forests, the presence of *objects of ecological value* words was found to be an accurate indicator of the expression of this belief. However, paragraphs containing both *objects of ecological value* words and *roadless* words were counted as expressions of the belief *Ecological Benefits of Roadless Areas* rather than *Ecological Costs*.

Most of the paragraphs coded as the belief *Ecological Costs* were descriptions of ecological damage attributed to logging roads. For example,

The expansion of the forest road system furthers the  $\frac{\text{pollution}}{\text{ecological damage}}$  of our  $\frac{\text{water}}{\text{ecological object}}$  supply, fosters  $\frac{\text{landslides}}{\text{ecological damage}}$  and  $\frac{\text{fragments}}{\text{ecological damage}}$  precious  $\frac{\text{wildlife habitat}}{\text{ecological object}}$ .

(Wray, 1997, p. A-12)

This example illustrates two applications of the rule that specified that a paragraph in which an *ecological objects* word appeared within 50 characters of an *ecological damage* word be counted as an expression of the *Ecological Costs* belief. Paragraphs such as this, which contained multiple expressions of the same belief, were counted as a single expression. If a paragraph contained expressions of more than one of the eight beliefs, however, each of the beliefs was counted once.

The process of developing the computer instructions and dictionaries included repeatedly applying them to random samples of text, examining accuracy and comprehensiveness of the coding decisions that were made, and modifying the instructions and dictionaries as needed. Following development and refinement of the rules and dictionaries, a formal validity analysis was carried out.

## CHECKING VALIDITY

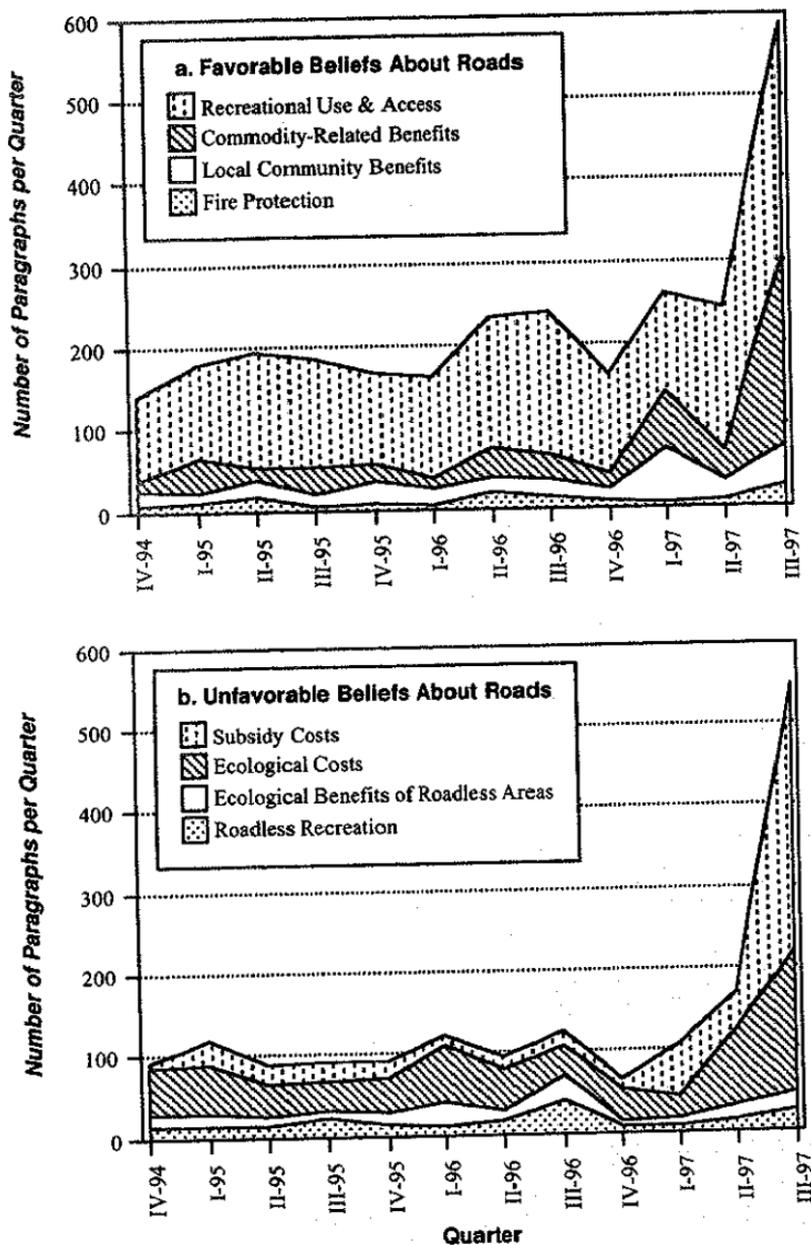
A content analysis variable is valid to the extent that it measures the concept it was intended to measure (Weber, 1990). We examined a random sample of about 400 stories that were coded using our computer instructions to determine whether they were able to accurately identify expressions of the eight categories of beliefs about roads at least 80% of the time—a rule of thumb sometimes used in content analysis. After final refinements in the computer instructions and dictionaries, the accuracy rates were as follows: *Recreational Use and Access* (87%), *Fire Protection* (80%), *Commodity-Related Benefits* (83%), *Local Community Benefits* (100%), *Subsidy Costs* (95%), *Ecological Costs* (87%), *Ecological Benefits of Roadless Areas* (100%), and *Roadless Recreation* (100%).

## RESULTS

Figures 3a and 3b show the total number of paragraphs per quarter in our national and regional text databases that were coded as expressions of each of the eight beliefs about roads on the national forests. These figures reveal that the level of discussion about roads was relatively stable during most of 1995 and 1996, increased gradually during the first half of 1997, and increased dramatically in the third quarter of 1997. The total number of filtered paragraphs in our databases (not just the paragraphs that were coded as expressing one or more of the eight beliefs) increased from an average of about 500 paragraphs per quarter throughout most of the 3-year period to almost 1,300 paragraphs in the final quarter. This increased discussion of roads in the news media was due to narrowly defeated proposals in the U.S. House of Representatives (July 11, 1997) and the U.S. Senate (September 17, 1997) to make major cuts in spending on roads in the national forests.

For all news sources combined, *Recreational Use and Access* was by far the most frequently expressed belief about roads during the entire time period, accounting for about 40% of all favorable and unfavorable beliefs (Figure 3a). The belief that roads entail *Ecological Costs* was the second most prominent belief (Figure 3b), accounting for 16% of expressions of all favorable and unfavorable beliefs during the 3-year period. This was followed by *Subsidy Costs* (13%), *Commodity-Related Benefits* (13%), *Local Community Benefits* (7%), *Roadless Recreation* (5%), *Ecological Benefits of Roadless Areas* (4%), and *Fire Protection* (3%).

In addition to the increased volume of discussion in the third quarter of 1997, the nature of the discussion of roads in the news media also changed:



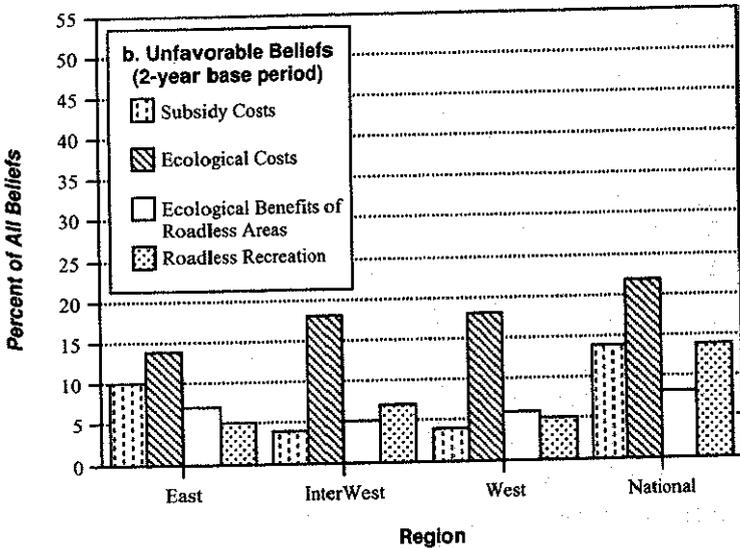
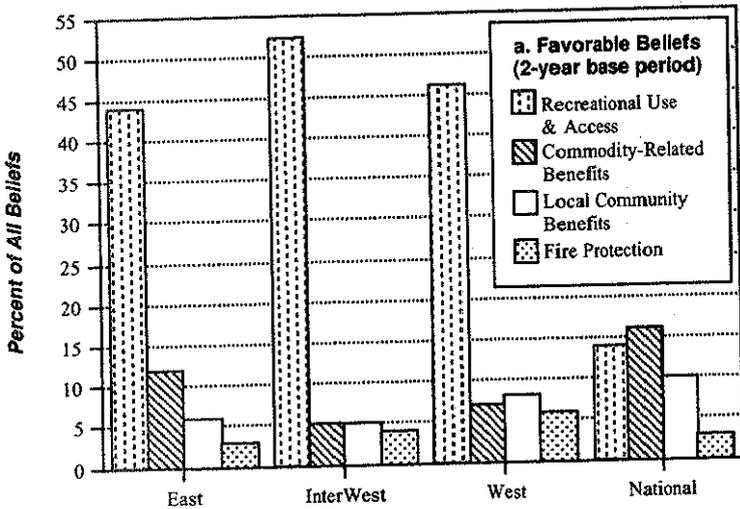
**Figure 3: Favorable and Unfavorable Beliefs About Roads on the National Forests Expressed in the News Media (national and regional news sources combined)**

*Subsidy Costs* of roads were expressed most frequently (accounting for 29% of all beliefs), followed by *Recreational Use and Access* (25%), *Commodity-Related Benefits* (20%), and *Ecological Costs* (15%). A clear implication of the trends shown in Figure 3 is that discussion of roads on the national forests was atypical in the third quarter of 1997. The following discussion therefore looks separately at a 2-year base period of relative stability and normality (Figures 4a and 4b) and the third quarter of 1997 (Figures 5a and 5b).

Figures 4a and 4b summarize the relative frequency of expression of the eight favorable and unfavorable beliefs about roads during the 2-year period from the fourth quarter of 1994 through the third quarter of 1996. Regional and national news sources are distinguished in these figures. Figure 4a shows the relative frequency of favorable beliefs about national forest roads and reveals that expressions of the belief that roads provide *Recreational Use and Access* were dominant in regional news coverage (accounting for 44% of all beliefs in the East, 52% in the InterWest, and 46% in the West), but not in national news sources (14%).

Expressions of *Commodity-Related Benefits* and *Local Community Benefits* of roads were most prominent in national news sources, perhaps reflecting the importance of these viewpoints in national-level policy discussions (Figure 4a). It may seem surprising, at first glance, that *Commodity-Related Benefits* of roads were expressed more often in the East than in the other regions, because most commodity production (timber harvesting, mining, ranching) occurs in the West and InterWest. But this may simply reflect a higher share of national-level policy discussion in Eastern newspapers relative to the other regions, that is, given the small percentage of national forest lands in the East, newspapers in the East may tend to draw on and mirror national news sources more than newspapers in the West and InterWest.

Figure 4b summarizes the relative frequency of expression of the four unfavorable beliefs about roads during the 2-year base period. In each region and in the national discussion, the belief that roads entail *Ecological Costs* was expressed most frequently, accounting for 14% in the East, 18% in the West and InterWest, and 22% in the national discussion. Expressions of the *Subsidy Costs* belief accounted for 14% of all beliefs in national news sources and 10% in the East, but only 4% in the InterWest and West. As in the case of commodity benefits, this may reflect a higher share of national-level policy discussion in the East than in the other regions. Expression of the two beliefs related to roadless areas—*Ecological Benefits of Roadless Areas* and *Roadless Recreation*—was relatively low in each region but much higher in national news sources during the 2-year base period. Overall, discussion of



**Figure 4: Percentage of Favorable and Unfavorable Beliefs About Roads on the National Forests Expressed in the News Media by Region, for the 2-Year Base Period April 1994 Through March 1996**

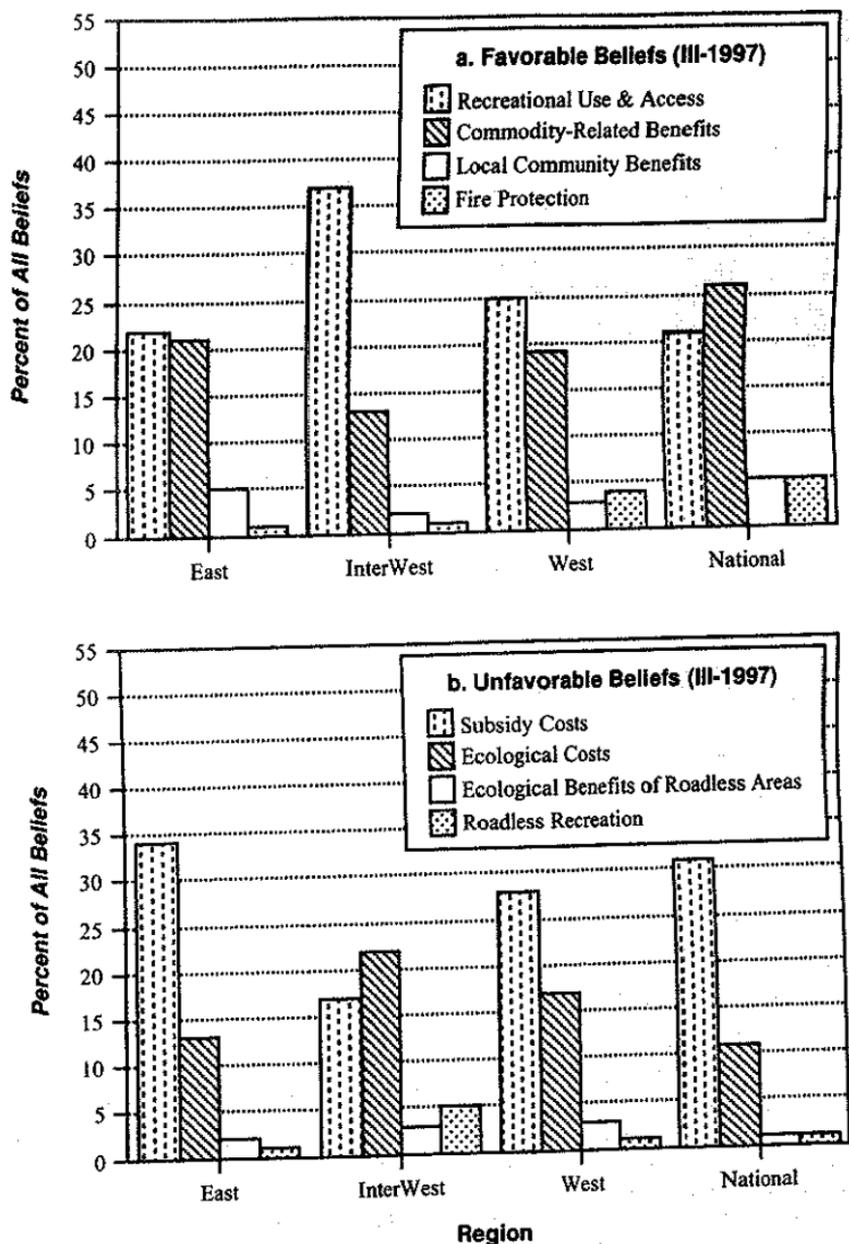


Figure 5: Percentage of Favorable and Unfavorable Beliefs About Roads on the National Forests Expressed in the News Media by Region, for the Third Quarter of 1997

roadless areas and issues accounted for about 10% of media discussion of roads on the national forests.

Figures 5a and 5b summarize the relative frequency of expression of the eight beliefs during the third quarter of 1997. A major shift in the social debate about roads is evident during this quarter, in which congressional battles over funding for road building were a major focus of media discussion. The share of expressions of *Commodity-Related Benefits* of roads increased markedly during this quarter (Figure 5a), as did the share of the *Subsidy Costs* belief (Figure 5b). Discussion in the news media about national forest roads in the third quarter of 1997 consisted largely of two favorable views (recreation and commodity benefits) and two unfavorable views (subsidy and ecological costs); none of the other four beliefs accounted for more than 5% of the discussion.

## DISCUSSION

The dominance of expressions of recreational uses of national forest roads in the news media in the 2-year base period—and relatively little discussion of commodity-related uses—is roughly consistent with actual use of the road system in national forests. An estimated 1.7 million vehicles associated with recreational activities traveled national forest roads each day in 1996, more than 10 times the number in 1950 (Coghlan & Sowa, 1998). This compares with about 15,000 logging trucks and other vehicles associated with timber harvesting and about 9,000 Forest Service administrative vehicles each day.

The finding that beliefs about recreational uses of national forest roads were expressed more than commodity uses is also consistent with survey results. In a national survey of the public, 62% of respondents agreed or strongly agreed (and 22% disagreed or strongly disagreed) with the statement "Creating recreation opportunities (boating, hunting, camping, etc.) on public forest lands is important to me" (Hammond, 1994, p. 3). When the same survey asked about commodity uses, however, only 36% of the public agreed or strongly agreed (and 47% disagreed or strongly disagreed) with the statement "Natural resources in public forests and grasslands should be made available to produce consumer goods" (p. 9).

Figure 4a reveals significantly less discussion of *Recreational Use and Access* at the national level than in the three regions. In addition to the difference in the quantity of recreation discussion, the nature of the discussion also differed: Most of the discussion of recreation at the national level was in the

form of arguments and opinions about the importance of roads for recreational purposes, whereas regional discussion of recreation consisted mostly of descriptions of roads—often abandoned logging roads—being used for nonmotorized recreation activities on specific national forests. For example,

We camped on a stony ridge that still showed a few signs of the well-used logging road it had once been. (Garth, 1995, p. C-12)

For mountain bikers, the county has many miles of abandoned logging roads. The county is developing a map of the trails, but in the meantime, bikers can buy a map from the U.S. Forest Service. (Wigglesworth, 1996, p. F-9)

Thus, the use of abandoned or gated logging roads for a variety of nonmotorized recreational purposes was prominent in regional news media discussion of national forest roads.

The fact that *Ecological Costs* was the most frequently expressed unfavorable belief indicates a relatively high level of concern about ecological impacts associated with roads and road building. This high level of concern is consistent with a large number of studies of environmental attitudes and concern carried out in recent decades (see Ladd & Bowman, 1995, and studies cited therein).

The belief that construction of logging roads on the national forests is a subsidy to the timber industry was the most salient belief during the third quarter of 1997. This belief was widely expressed both by representatives of environmental groups and fiscal conservatives concerned with government spending and waste, which likely added to the persuasive impact of this message on attitudes toward roads held by the public. In addition, the subsidy belief was often expressed in combination with the belief that roads are environmentally damaging, as shown in the following examples from the third quarter of 1997:

The network of subsidized logging roads—now over 380,000 miles—has disturbed wildlife and caused soil erosion. (“End Harmful Subsidy,” 1997)

Fiscally wasteful and environmentally destructive. (“Those Pricey Back Roads,” 1997)

This analysis has shown that a range of different beliefs about roads on the national forests are held and expressed in the ongoing social discourse about this issue. Some of these beliefs support a favorable attitude toward roads,

and others support an unfavorable attitude. Underlying these attitudes and beliefs is a set of forest values (Figure 1), defined earlier as broad and relatively enduring conceptions of what is good or desirable about forests. As indicated in Figure 1, the forest values underlying favorable attitudes toward national forests roads (and their associated beliefs) are predominantly economic or utilitarian in nature. For example, the beliefs that roads are needed to produce commodities, generate benefits to local communities, and provide access for fire fighting and other management activities are based primarily on economic values and motivations. The belief that roads provide access for recreational uses is based on a more diverse set of forest values. Recreation is valued for economic and utilitarian reasons (i.e., recreation activities satisfy individual preferences and market demands), but most people also attach deeper meanings and values to recreation experiences, including aesthetic values (in which beauty is the concept of the good) and moral/spiritual values (in which forests are valued noninstrumentally, as an end in themselves).

As shown in Figure 1, the forest values underlying unfavorable attitudes toward roads (and their associated beliefs) include economic/utilitarian values (underlying *Subsidy Costs* and *Roadless Recreation*) and aesthetic and moral/spiritual values (underlying *Roadless Recreation*). But, they also include ecological values as a prominent component. Ecological values reflect the view that forests and forest ecosystems are good because they provide life-supporting environmental functions and services on which human well-being ultimately depends, such as clean air and water, maintenance of wildlife and biodiversity, recycling of nutrients, generation of soils, flood and erosion control, and so on. Several recent surveys found strong ecological value orientations toward the national forests among the public (e.g., Manning, Valliere, & Minter, in press; Steel, List, & Shindler, 1994). Xu and Bengston (1997) found increasing salience of ecological values associated with the national forests from the early 1980s through the early 1990s. Hays (1988), Power (1996), and others have argued that ecological values associated with public lands have increased in relative priority. The values underlying unfavorable attitudes toward roads are thus more consistent with the emerging forest values in society than the economic/utilitarian-dominated values underlying favorable attitudes toward roads. Traditional economic values and uses of national forest roads are still important. But, as ecological values increase in relative importance, commodity-related uses of roads—and increasing recreational uses—should be carried out in ways designed to minimize ecological impacts.

## CONCLUSIONS AND IMPLICATIONS

This study has provided a glimpse inside the ongoing public debate about roads on the national forests. Attitudes, beliefs, and underlying values related to forest roads were identified, the most salient beliefs were distinguished, and the change in the nature of the discussion in the third quarter of 1997 was examined. The debate is a complex one, with a diversity of stakeholders expressing a wide range of beliefs about forest roads. There are no easy answers for developing a new road policy on the national forests, but this analysis suggests two dilemmas that must be addressed.

The combination of the dominance of expressions of recreational uses among the favorable beliefs (Figure 3a) and the dominance of expressions of ecological costs among the unfavorable beliefs (Figure 3b) during the 2-year base period points to a fundamental dilemma for road policy on national forests. On one hand, the existing road system is heavily used for recreational purposes, the demand for recreation on the national forests is increasing rapidly, and almost all recreation in national forests is dependent on road access to some degree. On the other hand, roads are widely perceived as a threat to increasingly important ecological values, and the very presence of roads can reduce or eliminate opportunities for solitude and wilderness recreation experiences. National forest policy on roads in the future will have to deal with these conflicting factors. Access for recreationists must be provided in ways that do not degrade or destroy the very environmental attributes that draw people to the forests in the first place. Effective policies will need to be informed by the work of recreation ecologists and others who have studied the ecological impacts of outdoor recreation (e.g., Liddle, 1997).

A second dilemma for national forest road policy stems from the fact that recreationists are a highly heterogeneous group, ranging from wilderness purists to those who prefer to visit forests in luxurious motor homes or explore forests using other motorized vehicles. For the former group of recreationists, the presence of roads and motorized vehicles is antithetical to the recreation experiences they seek. For the latter group, roads are not just a means of access to national forests but an integral part of the recreation experience itself. Roads are both providers of and barriers to recreational opportunities, depending on the nature of the experience that recreationists desire. Recreationists are thus deeply divided about an appropriate road policy, and conflict between motorized and nonmotorized recreationists may supplant conflict between commodity and noncommodity interests as the dominant source of contention over national forest management.

Additional research is needed to better understand current and expected future uses of roads on the national forests, and people's attitudes, beliefs, and values related to this extensive road system, including research addressing such basic questions as the following:

- In what ways are different types of roads on the national forests used? How often are they used? When are they used? Are use patterns changing?
- What are the attitudes and beliefs of diverse groups of users and stakeholders of forest roads? Are these attitudes and beliefs changing?
- What motivates different users of forest roads? What underlying values are held by different user groups? Are these values changing?
- Can common ground be found among diverse users and stakeholders? What are the most effective methods for collaboratively working out differences between diverse users and stakeholders to develop a new policy for national forest roads?

The Forest Service's ongoing efforts to revise national forest road policy can be viewed as a response to changing social conceptions of what is good and desirable about these public lands. As a former Forest Service regional forester observed, "From their inception, policies regarding national forestry have been set by the social values of the day, not by foresters and forest science" (Barker, 1994, p. 60). Developing a policy that more accurately reflects current and emerging social values would be enormously simplified if there were widespread agreement about those values. The challenge facing the Forest Service and other land management agencies is to develop policies that reflect a diversity of attitudes, beliefs, and values in an increasingly pluralistic society. Analyzing the social debate about roads and other natural resource management issues reflected in the news media is one way to monitor the social context in which decisions and policies need to be made, thereby resulting in better informed policies that are more responsive to the changing social environment.

## NOTES

1. Gated roads are physically closed to motor vehicle use to protect wildlife habitat, to provide opportunities for nonmotorized recreation activities, to minimize environmental impacts, and to reduce road maintenance and reconstruction costs (Coghlan & Sowa, 1998).

2. A national sample of the public was also included in this survey, but the response rate was only 18%.

3. The view that the media are biased is sometimes raised as an objection to using the news media to indirectly measure public attitudes and beliefs. But if, as the literature suggests, the media play a key role in influencing public attitudes and beliefs, then the issue of media bias is not crucial: The public will be influenced by the media regardless of bias. Media bias has been extensively researched by communications researchers (see McQuail, 1994, pp. 255-256).

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