Conflict Over Natural Resource Management: A Social Indicator Based on Analysis of Online News Media Text

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An indicator of the level of conflict over natural resource management was developed and applied to the case of U.S. national forest policy and management. Computer-coded content analysis was used to identify expressions of conflict in a national database of almost 10,000 news media stories about the U.S. Forest Service. Changes in the amount of news media discussion involving conflict were tracked over the 5-year period from 1992 through 1996. The relative level of conflict over national forest policy and management measured by this indicator was found to correspond with major conflict-related events during this time period. This social indicator could be used to evaluate policies intended to reduce conflict, monitor contentious issues, and identify emerging areas of conflict.

Keywords computer-coded, conflict, content analysis, national forest, natural resource management, news media, social indicator, USDA Forest Service

The Forest Reserve Act was signed by President Benjamin Harrison on March 3, 1891, after two decades of contentious congressional debate over the nation's forests (Steen 1991). Conflict has thus surrounded U.S. forest policy and management since before the inception of the national forest system, and continues to this day. The level of conflict increased dramatically in the years following World War II, as the demand for lumber and other forest products skyrocketed and political pressure led to dramatic increases in the amount of timber harvested on the national forests. At the same time, participation in outdoor recreation grew dramatically and the modern environmental movement took root and grew in the 1960s (Hays 1987; Hirt 1994). Increased conflict was inevitable between timber and other commodity interests, on the one hand, and recreationists and environmentalists on the other hand. In recent years, old-growth forests, the northern spotted owl and other endangered species, below-cost timber sales, motorized versus nonmotorized recreation, salvage logging, and many other issues have been flash points for conflict over forest management.

In this study, we used computer-coded content analysis of news media stories to measure the relative level of conflict related to policy and management of the U.S. national forests from 1992 through 1996. Ample evidence exists of a strong relationship between the amount of news coverage of contentious issues and where such issues rank on the public agenda (see Miller 1997 and studies cited therein). Therefore, our conflict indicator measures both the relative level of national forest conflict and public perception of the level of conflict.

A content analysis procedure was developed to identify expressions of conflict related to public forests in a large database of news media text, and changes in the quantity of media discussion involving conflict were tracked over time. This procedure and the resulting indicator of conflict could be used to:

- Evaluate the effectiveness of new policies intended to reduce conflict.
- Monitor the level of conflict associated with particular issues.
- Alert policymakers about emerging contentious issues.

The following sections cover the data, methodology, results, and discussion. A concluding section discusses the implications of this study for public forest policy and future research.

Data and Methodology

Data for this evaluation consisted of news media stories about the U.S. Department of Agriculture (USDA) Forest Service for the 5-year period January 1, 1992, through December 31, 1996. News stories were downloaded from the LEXIS-NEXIS commercial database. The reference book *Fulltext Sources Online* (Orenstein 1996) and the LEXIS-NEXIS *Directory of Online Services* (Gongla-Coppinger 1996) were used to identify all news sources for which the complete texts of all stories were continuously available online during the 5-year period of interest. Thirty-three news sources were identified, including newspapers from around the nation (e.g., *USA Today*, *New York Times*, *Lewiston Morning News*, *St. Louis Post-Dispatch*), news wires (e.g., UPI State & Regional Wires, States News Service), and television and radio news transcripts (e.g., CNN News, National Public Radio). These news sources were then searched on the NEXIS database using the search command [(Forest Service) or (national forest)] and not [(Texas Forest Service) or (Kaczynski) or (murder) or (homicide)].[1] For the period from 1992 to 1996, the search yielded a total of 22,634 stories in the NEXIS database. Out of this total population, we retrieved a random sample of 9995 stories for inclusion in our analysis. To minimize the inclusion of irrelevant text, the retrievals did not include the full text of stories. Only text within 100 words of the phrase "Forest Service" or "national forest"- 50 words on either side- was downloaded. This greatly reduced the amount of irrelevant text that would have been retrieved from stories that mentioned these phrases only in passing.

The objective that guided the development of our content analysis procedure was to produce an indicator of conflict over forest policy and management. We developed a list of words and phrases- called a *dictionary* in the nomenclature of content analysis- and a set of computer rules to identify expressions of forest conflict. Development of the forest conflict dictionary and coding rules involved an iterative process. An initial dictionary was developed by examining a random

sample of news media stories from our database of text. The initial dictionary and coding rules were then refined by examining the coding decisions made by the still-evolving computer rules and modifying the dictionary and rules until computer coding of the text agrees with the analyst's interpretation of the text.[2] Words and phrases that were found to be used ambiguously or incorrectly for the purposes of this study were dropped. For example, the word "sue" (with spaces before and after the word) was originally included as an indicator of legal conflict. But examination of the use of this word in context revealed that it sometimes appeared as a given name, as in "Forest Service spokeswoman Sue Smith said …." The word "sue" was therefore dropped.

Seven categories of words and phrases were included in our final conflict dictionary:

1. *Participants* that fill various roles related to conflict, such as agitators, assailant, appellant, attorney, critics, demonstrators, dissenters, factions, federal judge, lawyer, litigators, magistrate, protesters, terrorists, whistleblower, etc.
2. *Anger* and related emotions, such as angry, animosity, bitter, discontent, disgruntled, furious, incensed, irate, ire, mistrust, resentment, vitriol, wrath.
3. *Name-calling*, such as eco-freak, enviro-revolutionaries, extremists, forest circus (referring to the Forest Service), name-calling, timber barons, timber beasts, tree hugger, zealot, etc.
4. *Other derogatory characterizations*, such as addlebrained, bullying, capricious, charade, eco-babble, dictatorship, disingenuous, fallacious, flim-flam, hair-brained, hogwash, insidious, ludicrous, mean-spirited, overzealous, pandering, propaganda, reprehensible, schizophrenic, subterfuge, witch hunt, etc.
5. Terms referring to *legal battles*, such as affidavit, court battle, court order, district court, federal court, illegal, injunction, intend to sue, judicial, lawsuit, legal action, litigation, plan to sue, prosecute, restraining order, sued, suing, etc.
6. *Civil disobedience*, such as chained himself, chained themselves (referring to chaining oneself to a tree or logging truck), civil disobedience, monkeywrench, spiked, spiking (referring to tree spiking), terrorism, violence, etc.
7. *General conflict words*, that is, a large number and wide variety of other words and phrases associated with conflict, such as at odds with, at each other's throats, badmouth, bickering, brouhaha, contentious, cried foul, decry, divisive, drawn fire, fray, friction, hot button, in-your-face, irreconcilable, lightning rod, loggerheads, powder keg, polarized, schism, sniping, squabble, tempestuous, timber wars, turmoil, under-seige, up-in-arms, vendetta, wrangling, etc.

In addition to the main conflict dictionary, two other dictionaries and a set of rules relating them were developed to capture additional expressions of conflict. One dictionary consisted of words and phrases dealing with wildfires and insect infestations (e.g., blaze, fire, firefighters, gypsy moth, hot shots, infestation, insect, smokejumpers, etc.), and the other captured the idea of fighting (e.g., assault, attack, battling, battleground, fight, fought, front line, warfare, etc.). A computer rule specified that if a word from the fight dictionary appeared in the same paragraph as a word from the fire/insect dictionary, it was deleted (i.e., not counted as an expression of conflict). A second rule specified that other instances of words from the fight dictionary- those in paragraphs without fight/insect words- were counted as expressions of conflict. Together, these rules excluded paragraphs that discuss "fighting wildfires," "battling a blaze," or "declaring war on the gypsy moth," but included discussion involving conflict between people and between social groups.

TABLE 1 Examples of News Media Text Expressing Conflict Over Forest Management, With Words in Boldface Contained in Our Conflict Dictionary

"After years of political and legal **bickering** over logging in the west…" (3-18-95, *Christian Science Monitor*).

"… called the plan an assault on democracy. He predicted it will stir more **civil disobedience** among conservationists." (3-20-92, *Lewiston Morning Tribune*).

"And in a continuing **controversy** over the northern spotted owl, now that the bird is an endangered species, the Forest Service claims that 20,000 jobs will be lost." (1-29-92, National Public Radio, *All Things Considered*).

"Logging on federal lands in the northwest has been severely curtailed since 1990, when a federal **court order** placed the northern spotted owl under protection." (2-14-95, *Los Angeles Times*).

"It's a thoroughly **reprehensible** decision. They don't want to (decide) because Clinton's little **eco-freak** friends would hit the ceiling. … Timber industry officials **complained** that was too little, while environmentalists **complained** about the increase in maximum tree size." (8-11-96, *The Sacramento Bee*).

"Stevens was **incensed** over Lyons' failure to follow laws enacted by Congress to cut more trees in national forests in Alaska, Washington, Oregon and northern California where logging has been curtailed to protect fish and wildlife." (9-20-95, Associated Press).

The process of refining the conflict dictionary by applying it to a sample of text, assessing the accuracy of coding in context, and revising the dictionary and rules as needed was repeated until a satisfactory level of validity was achieved. Content analysis researchers often define a satisfactory accuracy level as 80% or greater. We achieved a 95% accuracy level in this study, because conflict is a well-defined and relatively easy concept to capture with computer-coded content analysis. Table 1 provides examples of news media text that coded as expressions of conflict.

Once the conflict dictionary and word relationship rules were finalized, expressions of forest conflict were counted by applying them to our database of news media text. Using the InfoTrend software (see note 2), we searched our database for the words and phrases contained in the dictionary. Each paragraph in the database that contained one or more of the words and phrases in the dictionary was counted as one expression of forest conflict. Conflict expressions were then aggregated by quarter in order to develop time trends.

Results and Discussion

Figure 1 displays the total number of paragraphs each quarter that scored as conflict paragraphs over the period 1992 through 1996.[3] The relative level of national forest conflict, as measured by our indicator, has risen and fallen over time in accordance with major conflict-related events. The following paragraphs discuss potential relationships between the findings presented in Figure 1 and key events during this time period. No causal linkage has been shown, and therefore the discussion offered here is speculative.

Early 1992: Relatively high conflict. Conflict was relatively high during the first three quarters of 1992. This would be expected, because the early 1990s were
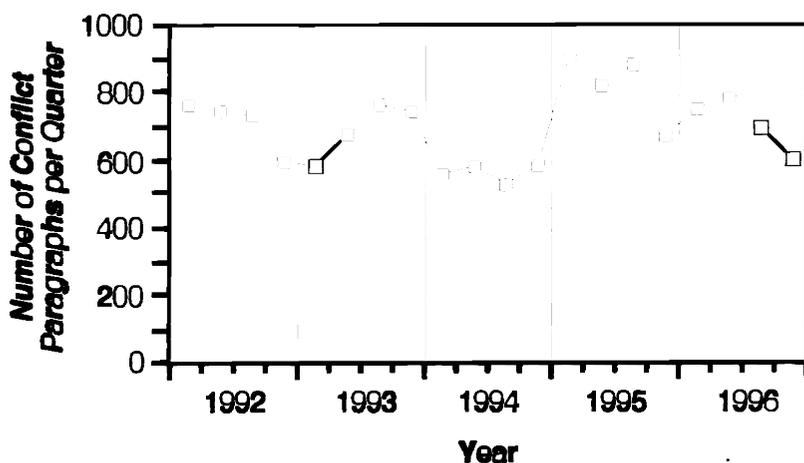
FIGURE 1 Number of paragraphs in the news media expressing conflict over national forest policy and management, 1992–1996 (plotted quarterly).

marked by bitter conflict over management of the old-growth forests of the Pacific Northwest (Moore, 1993).

June 1992: Ecosystem management policy. Our indicator of national forest conflict declined in the fourth quarter of 1992 and first quarter of 1993 following the announcement of a major shift in Forest Service policy. In a memo dated June 4, 1992, former Forest Service Chief Dale Robertson announced that ecosystem management was a new official policy for the agency. Jones et al. (1995) argued that the Forest Service adopted ecosystem management as an attempt to "resolve a state of perpetual conflict" (p. 161). Public attitudes toward ecosystem management and media discussion of this approach to natural resource management have been mostly favorable (Bengston and Fan 1997).

1993: Clinton's Forest Conference. After declining in late 1992 and early 1993, our conflict indicator rose throughout most of the rest of 1993 (Figure 1). This may be due to President Clinton's "Forest Conference" and related events. President Clinton, Vice-President Gore, and several cabinet members held a day-long Forest Conference in Portland, OR, on April 2, 1993. The purpose of this meeting was to resolve conflict over the logging of old-growth forest and preservation of the endangered northern spotted owl. Walker and Daniels (1996) analyzed the Forest Conference as a conflict management effort. They showed that initial reactions to the conference were positive, with environmentalists, timber interests, and other groups praising the effort. But that changed dramatically with the release of the report produced by the Forest Ecosystem Management Assessment Team (FEMAT 1993), a group of federal and academic scientists charged by Clinton with developing a comprehensive management plan for the federal forests of the Pacific Northwest. None of the stakeholders involved in the debate over forest management were pleased with "Option 9," the preferred alternative in the Clinton Forest Plan. On August 30, 1993, a forest industry association was the first of several groups to file suit in federal court seeking to void the FEMAT effort on the basis that it violated the Federal Advisory Committee Act of 1973 (FACA). Walker and Daniels

(1996) concluded that rather than reduce conflict, "the Forest Conference and FEMAT framework may have contributed to the contentious pattern of federal forest policy formation in the Pacific Northwest" (p. 90).

1994: A new Forest Service Chief. The level of conflict dropped significantly in the first quarter of 1994 and remained relatively low throughout 1994. This could be attributable, at least in part, to a "honeymoon" period for Jack Ward Thomas, who was appointed Chief of the Forest Service in November of 1993. There was wide-spread praise from environmental groups for Thomas's appointment as Chief during his first year on the job.

1995 and early 1996: Salvage logging. Our conflict indicator increased dramat-ically in the first quarter of 1995, remained high in the second and third quarters, and then followed a generally declining trend. The contentious issue of salvage logging was widely discussed in the news media in the first half of 1995 as timber salvage legislation worked its way through Congress.[4] President Clinton signed the 1995 "Rescissions Act" (P.L. 104-19) in July 1995. Attached to this spending bill was unrelated language on salvage logging (Section 2001). Salvage logging generated strong opposition from environmentalists, who portrayed it as a ploy to increase timber harvests on federal lands- including the harvest of healthy and old-growth forests- while suspending environmental laws related to logging and eliminating public scrutiny and debate (e.g., Bass 1996).

July 1996: Salvage logging policy change. A significant tightening of salvage logging regulations was announced in a memo from Agriculture Secretary Dan Glickman to Forest Service Chief Jack Ward Thomas dated July 2, 1996. This change in policy was a response to the critics of salvage logging, and may have been a factor in the declining level of conflict in the third and fourth quarters of 1996.

Concluding Thoughts

This study described the construction and application of a social indicator for forest policy and management. Several extensions could be added to make this conflict indicator more useful. First, the media discourse dealing with national forest conflict could be broken down into individual contentious issues, making it possible to track the level of conflict related to old-growth forests, road building, salvage logging, motorized versus nonmotorized recreation, and other issues. Second, in addition to a nationwide indicator of forest conflict, calculation of regional or subregional indicators- based only on regional or local news sources- would be interesting and useful in forestry. Our conflict indicator is most sensitive to national issues or regional issues that gain national prominence. But some regions of the United States have been hotbeds of controversy, especially the Pacific Northwest. As more small community newspapers become available online in the future, it will be possible to calculate separate conflict indexes for each region or even each state.[5] Finally, an important extension of this research would be to statistically analyze trends in con-flict. For example, a linear probability model could be used to determine the sta-tistical significance of trends, a generalized logit model could be used to test hypotheses concerning differences in conflict between regions, and time-series experiments could be conducted to evaluate the effectiveness of policies designed to reduce conflict (Cook and Campbell 1979).

Conflict is an important and integral part of the social process of making deci-sions about and managing natural resources. To a large extent, conflict is how natural resources are managed in a democratic and pluralistic society. Even with greater public involvement and collaborative planning and decision making- or perhaps especially with those things- national forest management will be far from conflict free (Gerlach and Bengston 1994). The nature of public forest management suggests that the decision process will continually be open to new controversy. The social indicator described in this article may aid managers and policymakers in understanding and monitoring conflict over the management of natural resources.

Notes

1. This search command eliminated irrelevant stories about the Texas Forest Service, Theodore Kaczynski (the "Unabomber" whose cabin was adjacent to a national forest), and various homicide investigations in which bodies were found in remote areas of national forests. These "filter" words were added after examining text from an initial download of 1000 stories using only the search command ((Forest Service) or (national forest)).

2. The computer software used to carry out the content analysis was InfoTrend (Fan, 1988), developed by Prof. David Fan, Department of Genetics and Cell Biology, University of Minnesota.

3. It should be noted that this indicator reflects the relative level of national forest con-flict, not the actual level (i.e., our indicator would likely show some conflict even in the highly unlikely event that no actual conflict existed, due to the journalistic practice of balancing sources in a story and pitting sources against each other).

4. "Salvage" is a term that applies to logging in areas that have experienced a natural or anthropogenic disturbance, such as fire, disease, insect infestation, or blow-downs caused by heavy winds.

5. As a first step toward a detailed regional breakdown, we used this methodology to analyze three broad regions of the United States: the West, InterWest, and East. See Fan and Bengston (1997).

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