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# Characterizing the sustainable forestry issue network in the United States

Steverson O. Moffat[a,*], Frederick W. Cubbage[b], Thomas P. Holmes[c], Elizabethann O'Sullivan[d]

[a] *USDA Forest Service Southern Research Station, Forest Resource Law and Economics, Room T-10034, 701 Loyola Ave., New Orleans, LA 70113, USA*

[b] *Department of Forestry, NC State University, Raleigh, NC 27695-8008, USA*

[c] *USDA Forest Service Southern Research Station, Economics of Forest Protection and Management, P.O. Box 12254, 3041 E. Cornwallis Road, Research Triangle Park, NC 27709-2254, USA*

[d] *Department of Political Science and Public Administration, N.C. State University, Raleigh, NC 27695-8102, USA*

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**Abstract**

Issue network analysis techniques were applied to the issue of sustainable forestry in the United States to identify potential public and private outcomes for the issue. A quantitative approach based on work by Laumann and Knoke [The Organizational State (1987)] was utilized in conjunction with the Delphi method. Results suggest that the parity in the distribution of influence among network sectors means that moving the issue of sustainable forestry onto the formal policy agenda will require more consensus on problems and solutions than exists at the present time. Accordingly, broad policy actions resulting from the expansion of the issue of sustainable forestry are unlikely in the short-term. However, experts on the Delphi panel anticipate that changes will occur in response to sustainability issues. At the federal and state level, this is likely to result in changes to public forest management and to the objectives assigned to the USDA Forest Service and to the state forestry agencies. States are projected to draft new and to change old private forest practices regulations as a result of sustainable forestry concerns. In the private sector, the trend of applying criteria and indicator-based sustainable forestry management standards and certification programs will continue. Non-industrial private forest owners are projected to make the fewest direct accommodations. Finally, where directly comparable, the Delphi study's results were not significantly different from the quantitative approach, suggesting that Delphi has promise for network research applications. 

*Keywords:* Sustainable forestry; Issue networks; Delphi; US forest policy

* Corresponding author. Tel.: +1-504-5897133; fax: +1-504-5893961.
*E-mail address:* smoffat@fs.fed.us (S.O. Moffat).

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## 1. Introduction

Sustainable forestry (SF) has generated a high level of interest throughout the US forestry community, although many persons are unsure what SF will mean to them and to forestry (Sedjo et al., 1998). While some consider SF to be a passing issue akin to the 'new forestry' paradigm that affected forest policy discussions in the late 1980s and early 1990s, others see SF as a continuation of a process that in the US began with the introduction of scientific forestry methods in the early 20th century. Although claims have been made that SF results in new markets and market premiums for certified forest products in the US, concerns have been raised that SF will limit management options and raise costs (Viana et al., 1996; Berg and Olszewski, 1995). Based upon previous debates among US foresters about the merits of regulation, one question may have universal interest: Will sustainable forestry result in new federal or state regulatory policies?

This paper proposes and tests a method to answer that question. Network analysis studies organizations and individuals that form around an issue problem (Heclo, 1978). An issue network can consist of dozens and even hundreds of interest groups, prominent knowledgeable individuals, federal and state agencies, and legislative committees and subcommittees (Berry, 1997). Networks play a key role in the policy process by identifying problems and getting them on a policy agenda, starting a process that can result in new policies and programs (Anderson, 1984; Kingdon, 1984). Consequently, this paper assumes that to predict the effect of SF one starts with the players who initiate the policy process.

### *1.1. Network analysis*

Research on issue networks began with qualitative studies to demonstrate that networks existed (Milward and Provan, 1998). The next generation of studies used quantitative methods as part of social network studies (Aldrich and Whetten, 1981). With the introduction of quantitative methods, research on issue networks grew rapidly and moved beyond documenting relationships among members. Studies characterized the structure of networks (Heinz et al., 1993) and developed taxonomies of network types (Rhodes and Marsh, 1992; Blom-Hansen, 1997). Some scholars attempted to link network types to associated sets of policy outcomes (Knoke, 1990; Lehmbruch, 1991; Marin and Mayntz, 1991; Sciarini, 1996) and focused on influence relations among network members (Wilks and Wright, 1987). Others concentrated on methodology (Laumann and Knoke, 1987; Knoke et al., 1996). The largest body of the literature consists of case studies describing a discrete policy event (Borzel, 1998).

Two schools of thought dominate network research (Borzel, 1998): the interest intermediation school, centered in the United States, and Germany's governance school. The interest intermediation school interprets networks as a generic concept that applies to relations between public and private actors, whereas the governance school sees issue networks as a specific form of governance. The interest intermediation school largely regards issue network analysis as a tool for examining relations between the state and organizations of civil society. It assumes the existence of policy networks, which reflect the relative status or influence of particular interests in a policy area, and which affect policy outcomes (Borzel, 1998). Given the lack of a governing structure and the openness of transactions between government agencies and civic organizations in the SF issue network, the interest intermediation approach seems appropriate to this study.

Practically all network analysis has been applied to past events. This is largely because the researchers want to develop an explanatory model, rather than to chart potential outcomes. Another reason is stability: network conditions related to active issues are constantly changing. Such changes create a degree of imprecision that limits the effectiveness and explanatory power of models, but is less of a concern in research to identify potential short-term outcomes. An exception to this historical research trend was an investigation into the network motivated by the threat of earthquakes in the Pacific Northwest (Michaels, 1992). Network analysis has been applied to numerous environmental policy actions. Selected

examples include: Lenschow (1997), Richardson (1997), Daugbjerg (1998), and Steward and Conway (1998). Considerably less attention has been given to issue network analysis and forestry policy (Howlett and Rayner, 1995; Wellstead, 1996; Hoberg and Morawski, 1997; Cashore and Vertinsky, 1999). Finally, at the time this research was conducted, the technique had not been used to study US forestry issues.

Prior to committing to a network analysis for SF, however, a methodology needed to be chosen. Laumann and Knoke's (1987) book The Organizational State has a good reputation among scholars. Furthermore, their research linked influence characteristics with policy outcomes, which suggests that network analysis is appropriate to predict if SF will result in new policies. A closer look at Laumann and Knoke's methodology found three limitations: (1) their method of identifying the network population had the potential to weave a net that would miss many in the SF issue network. (2) The information they requested from respondents regarding allies and collaboration had the potential to reduce participation by government actors who are reticent to appear to exhibit favoritism. (3) Their approach used a costly but effective methodology, i.e. they conducted face-to-face interviews and achieved a 92.3% response rate. While mail-based surveys have problems with response rates, limited resources usually rule out interviews as a feasible methodology.

The first two concerns applied directly to the difficulties of analyzing an active issue. Consultation with others indicated that these problems would likely remain regardless of the method. Accordingly, the Laumann–Knoke approach was utilized, but the Delphi method was incorporated as a way to minimize these two problems. The Delphi method collects and distills knowledge from a group of experts by means of a series of questionnaires interspersed with controlled feedback (Ziglio, 1996). The method is often compared to a committee meeting where a brainstorming session yields group consensus. Proponents of Delphi claim that the anonymity, controlled feedback, and mathematical summarization are advantages over face-to-face meetings where dominant personalities may stifle others or monopolize the session, lack of agenda control can allow irrelevant digressions, and consensus may be assumed but not proven (Baumann et al., 1982).

Incorporating Delphi into network analysis addresses criticism that highly quantitative studies simplify network complexity in the quest for reliability. Combining the qualitative and quantitative approaches may achieve both quantitative precision while disclosing details that would have been missed otherwise (Marin and Mayntz, 1991). Delphi asks qualitative questions in a quantitative fashion that avoids much of the interviewing, coding, and other concerns of qualitative research methods. Numerous Delphi studies have been conducted on environmental problems (Baumann et al., 1982; Brogan, 1997; Wilenius and Tirkkonen, 1997). Delphi has also been applied to forestry research (de Steiguer et al., 1990; Egan et al., 1995). At the time this study was initiated, no research incorporating Delphi methods with issue network research had been conducted, and none appears to have been performed in the intervening months.

## 2. Methodology

### *2.1. Applying the Laumann–Knoke issue network analysis methodology*

Laumann and Knoke's methodology was used to (1) identify members of the SF issue network; (2) survey them; and (3) specify the coalitions and perceptions of each member's influence. The list of potential network members was generated from (1) a Lexis–Nexis search of articles in newspapers and news magazines covering all regions of the country; (2) SF-related hearings before major congressional subcommittees; (3) amicus curiae participants in SF-related cases before the federal appellate courts; (4) lobbyist registrations specifically for SF; and (5) suggestions by persons familiar with SF. A list of 177 groups was generated and categorized into six sectors: academia, federal government, forest industry, non-governmental organizations, foundations and private re-

search institutions, and state government and state associations.

A survey instrument was constructed from Laumann and Knoke's (1987) interview questions and implemented using Dillman's Total Survey Design Method (Dillman, 1978). The survey instrument was posted on the World Wide Web. Calling target organizations identified appropriate respondents who were sent a letter directing them to the survey's URL address and offering to send a paper survey if preferred. Responses were returned by e-mail and conventional mail.

A total of 85 surveys were returned for a response rate of 48%. An additional 31 persons indicated that they would not complete the survey, making the total contact rate 66%. Some non-respondents gave their reason for declining to participate. A majority of the federal actors declined for impartiality reasons; all non-responding research institutions cited lack of time. Seven percent of the respondents indicated that they were not involved in SF, including four of the seven responding federal government actors. Another federal organization refused to identify others with whom it communicates about SF. The end result was a representation rate of 10% for the federal government sector.

To measure influence, respondents were asked to identify the listed organizations that they regarded as particularly influential. The organizations were then ranked by the total number of votes each received. The ranked list was divided into quintiles, and the percentage of each sector represented in a quintile was calculated. This procedure reveals an influence structure. For example, Laumann and Knoke's (1987) study of energy and health policy found that 64.4% and 82.3% of the groups in their respective top influence quintile were federal government organizations, thus suggesting that federal agencies dominated the energy and health policy process.

To identify coalition memberships and describe the influence structure, Laumann and Knoke's multivariate ordination procedures were closely followed. Respondents were asked to (1) list the groups they join with when trying to influence policy; and (2) the names of the major organizations (including government agencies) which often oppose their policy positions. Based on the responses, a set of $x,y$ coordinates can be generated for each organization by calculating (1) its perceived influence in the network; and (2) its relationship (cooperative, non-cooperative) with other network members.

### 2.2. Applying the Delphi method

The Delphi method was used to create an alternate list and ranking of network members and to identify and estimate the likelihood of a set of policy outcomes. The information and ratings were supplied by experts identified for each of the six forestry sectors. The process of identifying experts used a reputational approach (Sanders, 1966): each selected expert had to be an acknowledged leader or recognized authority in the given sector, or be recommended by at least two consultants for this project. This generated a list of 50 potential panelists: 10 from forest industry; seven from the federal government; six representing state government or state associations; five from foundations or private research institutions; 12 from NGOs; and 10 from academia. Each was contacted by telephone and invited to participate; 94% of those identified as potential panelists agreed to participate.

Three rounds of surveys were conducted. The survey items were measured with ordinal scales that allowed panelists to indicate their level of agreement with a statement or to indicate their opinion regarding the likelihood of an event or outcome. Panelists were provided with guidelines to increase reliability of their answers, e.g. the term 'very likely' was defined using several parameters. Open-ended questions were used to identify network members. Finally, panelists were free to add their comments and questions.

The first round of the survey covered: (1) characterization of the network; (2) characterization of desired policy outcomes; (3) factors motivating network members; and (4) nomination of network members. The second round built on the first round and asked panelists to (1) clarify network types; and (2) rank the influence of identified groups. The final round expanded upon the policy outcomes and motivating factors by asking the

panelists (1) to rank nine motivating factors; and (2) to indicate the likelihood of a series of possible outcomes. Response rates varied among the three survey rounds. Some participants answered the first round but not the second and third rounds; a few skipped the first and third rounds and completed only the second round; and two did the first two rounds but not the third. Response rates were 79% in round 1, 95% in round 2, and 89% in round 3.

## 3. Results

### 3.1. The Laumann–Knoke survey

Following the procedure outlined earlier the influence structure was described. Laumann and Knoke (1987) caution the user against over-valuing this information. They note that utilizing a ratio metric has theoretical and empirical limitations. Nevertheless, it seems reasonable to expect that participants discriminate between those actors who count in their and others' calculations and those who are largely ignored. Accordingly, each organization's rank is less useful than is the distribution of influence among sectors in each quintile, with particular emphasis placed on the top 20%.

To provide greater detail, government and NGOs were separated into federal government and state government and environmental NGOs and forestry NGOs. This division results in the influence distributions in Table 1. Influence in the top quintile was fairly evenly distributed among government (31.4%), NGOs (31.4%) and industry (25.7%). The federal sector has the highest share of influence with 28.5% as compared with state governments share of 2.9%. Timber industry and environmental NGOs each have a 25.7% share of influence, with forestry NGOs, foundations, and academia sharing 5.7% each. The proportion of influence among government actors shifts through the lower quintiles with the state and federal sectors gaining and losing shares, respectively. All other distributions remained relatively constant throughout all quintiles. Unlike the energy and health domains described by Laumann and Knoke (1987), no single sector dominates the top level of influence in the network.

Unfortunately, the low response rate from the federal sector (10%) and the research institutions and foundations (17%) precluded valid application of the ordination procedures. Accordingly, the planned analyses to obtain the constituency view of influence structure and coalition memberships were not completed.

### 3.2. The Delphi survey

Panelists were initially asked to distinguish among the possibilities that groups promoting SF form: (1) an open issue network; (2) a public policy network (defined as an issue network seeking the formulation and implementation of public policy); or (3) a private policy network (defined as an issue network seeking the formulation and implementation of private policy). The panel indicated the highest level of agreement (84%) that SF groups form an issue network, although there was also agreement that the SF network fit the public policy network and private policy network (45% and 56%, respectively) definitions. Panelists were 41% confident about their answers to the exercise. The panelists nominated 312 different organizations, agencies, and individuals as being

Table 1
Distribution of influence votes across ranked quintiles of split sectors: quantitative survey

| | Federal Govt. | State Govt. | Forest industry | Env. NGO | Forestry NGO | Found/research | Acad. |
|---|---|---|---|---|---|---|---|
| Top quintile | 28.5% | 2.9% | 25.7% | 25.7% | 5.7% | 5.7% | 5.7% |
| Second quintile | 11.1% | 11.1% | 27.8% | 25.0% | 0% | 8.3% | 16.7% |
| Third quintile | 8.6% | 25.7% | 37.1% | 14.3% | 0% | 5.7% | 8.6% |
| Fourth quintile | 8.1% | 13.5% | 40.5% | 21.6% | 8.1% | 0% | 8.1% |
| Fifth quintile | 5.9% | 14.7% | 32.4% | 23.5% | 5.8% | 0% | 17.7% |

Table 2
Distribution of influence across ranked quintiles of split sectors: Delphi survey

| | Federal Govt. | State Govt. | Forest industry | Env. NGO | Forestry NGO | Found./research | Acad. |
|---|---|---|---|---|---|---|---|
| Top quintile | 23% | 6.6% | 21.3% | 23% | 6.6% | 13.1% | 6.6% |
| Second quintile | 21% | 9.7% | 11.3% | 32.2% | 8.1% | 8.1% | 9.7% |
| Third quintile | 8.2% | 13.1% | 14.8% | 23% | 0% | 9.8% | 31.2% |
| Fourth quintile | 0% | 16.1% | 50% | 17.7% | 1.6% | 3.23% | 11.3% |
| Fifth quintile | 3.2% | 24.6% | 44.3% | 11.5% | 0% | 6.6% | 9.8% |

active in promoting or pursuing SF in the United States.

In the second round, group rankings were used to describe the influence structure. As can be seen in Table 2, the results are similar to the Laumann–Knoke based rankings, with the federal/state results split 23% to 6.6% in the top quintile and with the proportions switching in the lower quintiles. Environmental (23%) and forestry NGOs (6.6%) have roughly the same difference between distributions throughout all quintiles. Industry firms comprise 21.3% of the top quintile and vary between 11% and 50% in the other four. Academia and research institutions comprise the smallest share, although research institutions and foundations have double the proportion (13.1%) as in the Laumann–Knoke (5.7%), while academia is roughly the same in both (6.6% vs. 5.7%). With some exceptions in the middle quintiles, these distributions remain similar throughout. Overall, panelists were 31.5% confident in their ability to rank the groups; 20% confident that the list captured all members of the network; and 42% confident that the list included all of the most influential members of the network.

### 3.3. Comparing the ratings

The results of the Laumann–Knoke and the Delphi influence distribution exercises were compared using the chi-square test to determine whether the distributions of influence were different between methods and quintiles. There were no statistically significant differences between the methods for any of the quintiles, with the most important top quintile showing the highest degree of similarity. The pertinent statistics for the chi-squared test are summarized in Table 3.

Table 3
Results of comparing the Delphi quintile rankings to the quantitative quintile rankings[a]

| | Top quintile | 2nd quintile | 3rd quintile | 4th quintile | 5th quintile |
|---|---|---|---|---|---|
| $\chi^2$ | 2.345 | 9.110 | 13.105 | 9.605 | 11.020 |

[a] d.f. = 6, $P < 0.010$.

### 3.4. Desired policy outcomes and motivating factors

In the first round survey a majority of the panel agreed that federal policy (66%), state policy (66%), and avoiding policy (82%) were desired outcomes for at least some of the groups in the SF network, illustrating conflicting objectives and lack of consensus among network members. The panelists also evaluated a list of factors likely to motivate organizations to participate in the network. The panelists expressed the most agreement that worries about other groups (100%) and societal interest in the environment (97%) were important motivators; less important were demand for certified products, United Nations' (UN) efforts, and tropical forestry programs. This suggests that participation in the SF network is not entirely altruistic. The highest confidence level (73%) was associated with this exercise.

In the third round this exercise was modified and repeated. Panelists ranked the importance of nine motivating factors (the original five plus four nominated by panelists). The top ranked motivating factors were dissatisfaction with past forest management practices, societal interest in the environment, and the desire to sustain forests, suggesting that SF has been absorbed into the broader debate over the desired management of

Table 4
Results of the exercise to rank factors motivating participation in the sustainable forestry issue (1 = most important factor, 9 = least important factor)

| Rank | % Rank[a] | Median rank | Factor |
|---|---|---|---|
| 1 | 61% | 2 | Dissatisfaction with past practices. |
| 2 | 52% | 2 | Societal interest in the environment. |
| 3 | 29% | 3 | Desire to sustain forests. |
| 4 | 16% | 4 | Dissatisfaction with past conflicts. |
| 5 | 26% | 5 | Worries about how SF will be defined. |
| 6 | 9% | 6 | Efforts by the United Nations. |
| 7 | 6% | 7 | New scientific discoveries. |
| 8 | 3% | 8 | Efforts for tropical timber. |
| 9 | 0% | 9 | Demand for certified forest products. |

[a] Percentage of panelists who ranked the factor as the first or second most important.

US forests. Further support for this observation exists in the lower rankings for the UN and other tropical forest programs that served as the origins for the modern concept of SF. The overall confidence rate expressed by the panel was 51%. Results of the ranking process are presented in Table 4.

The panelists estimated the likelihood of potential policy and other SF-related outcomes. Results for the federal-level outcomes indicates that new policy (84% agreement) and policy changes (90% agreement) are more likely to apply to federal lands and to selected federal land management agencies [USDA Forest Service 87%; Bureau of Land Management (BLM) 67%] than are new policies (25% agreement) or changes to old policies (42%) affecting private landowners. The Forest Service is projected to be the most likely to change management (80%) and structure (58%), with the BLM, Fish and Wildlife Service, and National Park Service increasingly less likely to incorporate SF into their management and structure. The complete results for this exercise are summarized in Table 5.

The panel indicated similar patterns in state level outcomes, although there is a substantially higher probability of state level actions with respect to private lands. A total of 61% of the panelists believed that new forestry policies affecting private landowners are likely as a result of SF, and 48% projected that changes in existing state policies for private landowners will occur. This compares with 80% agreement in the likelihood of new policies for state lands and 58% agreement with policy changes for state lands.

Table 5
Results of outcome projections for the federal sector

| | Federal level outcomes | | | | |
|---|---|---|---|---|---|
| | Very likely | Likely | Possible | Unlikely | V. unlikely |
| New policy for private land | 6% | 19% | 29% | 39% | 6% |
| New policy for federal land | 29% | 55% | 10% | 6% | 0% |
| Policy changes: private land | 10% | 32% | 29% | 26% | 3% |
| Policy changes: federal land | 45% | 45% | 10% | 0% | 0% |
| Policy of USFS | 39% | 48% | 13% | 0% | 0% |
| Policy of BLM | 19% | 48% | 23% | 10% | 0% |
| Policy of FWS | 10% | 23% | 32% | 32% | 3% |
| Policy of NPS | 6% | 19% | 35% | 35% | 3% |
| Change in USFS management | 48% | 32% | 16% | 3% | 0% |
| Change in BLM management | 23% | 35% | 29% | 13% | 0% |
| Change in FWS management | 10% | 19% | 29% | 42% | 0% |
| Change in NPS management | 6% | 16% | 39% | 35% | 3% |
| Structure of USFS | 19% | 39% | 23% | 19% | 0% |
| Structure of BLM | 10% | 26% | 29% | 35% | 0% |
| Structure of USFWS | 6% | 6% | 39% | 42% | 6% |
| Structure of NPS | 6% | 3% | 29% | 45% | 16% |

Table 6
Results of outcome projections for the state sector

| | State level outcomes | | | | |
|---|---|---|---|---|---|
| | Very likely | Likely | Possible | Unlikely | V. unlikely |
| New policy for private land | 16% | 45% | 26% | 13% | 0% |
| New policy for state land | 32% | 48% | 19% | 0% | 0% |
| Policy changes for private land | 13% | 45% | 29% | 13% | 0% |
| Policy changes for state land | 26% | 32% | 35% | 6% | 0% |
| Policy changes for agencies | 23% | 39% | 29% | 10% | 0% |
| Management of state lands | 29% | 42% | 26% | 3% | 0% |
| Structure of state agencies | 13% | 19% | 42% | 26% | 0% |

According to the combined opinion of this group of experts, SF will have large impacts in the public and private sectors at the state level. Complete results are presented in Table 6.

Private sector outcomes are projected to have the greatest impacts within forest industry (84%) and in the way forest industry procures wood and fiber from non-industrial private forest owners (NIPF) (61%). Less agreement (33%) exists regarding the likelihood of changes to NIPF lands. On the market side, 61% project an increase in the supply of certified wood products, but only 16% predict a price premium will develop, while 25% project that a differentiated market for certified/non-certified wood products will develop. Most panelists believe that consumers will spot efforts by industry to 'green wash' itself by paying only lip service to sustainability issues. The full results are summarized in Table 7. The panelists indicated that SF was likely to change university curricula, extension programs, and research. Finally, the panelists were 38% confident in their answers regarding potential outcomes.

## 4. Discussion

### *4.1. Identifying the issue network*

The 312 actors generated by the Delphi and the 177 yielded by the L–K study compares favorably with the numbers found by Laumann and Knoke (1987) in the health domain (135 members) and energy domain (198 members). Other researchers have determined that studying a high number of participants adds little to the overall quality of the research. For example, in a study of a private policy network Kenis (1991) utilized the L–K bounding method and then eliminated all but the 40 most influential groups based on consultation with experts. Nevertheless, at this stage of research into SF the full lists may be more

Table 7
Results of outcome projections for the private sector

| | Private sector outcomes | | | | |
|---|---|---|---|---|---|
| | Very Likely | Likely | Possible | Unlikely | V. Unlikely |
| Changes to industry | 26% | 58% | 13% | 3% | 0% |
| Changes to NIPF | 3% | 30% | 23% | 43% | 0% |
| Changes to procurement | 6% | 55% | 26% | 13% | 0% |
| Increased demand | 16% | 23% | 45% | 16% | 0% |
| Increased supply | 13% | 48% | 32% | 3% | 3% |
| Price differential | 3% | 13% | 37% | 40% | 7% |
| Public approval 'Green Washing' | 0% | 10% | 45% | 45% | 0% |
| Differentiated markets | 6% | 19% | 35% | 39% | 0% |

interesting and potentially useful for other purposes.

### 4.2. Ranking

In the majority of cases, the highest ranked groups in each sector were those that had taken concrete steps to implement SF programs. Among the federal actors, executive branch agencies such as the USFS, the BLM, and the President's Council on Sustainable Development headed the list. At the state level, programs which had been certified, which had comprehensive forest practices laws, or which had hosted certification demonstration projects were the highest ranked. Industry leaders were either involved in the American Forest and Paper Association's Sustainable Forestry Initiative or were among the companies with properties certified by Forest Stewardship Council-accredited firms. This trend carried through the research institutions and foundations where the leaders had all been involved in funding or facilitating certification projects. With few exceptions, NGOs were also headed by certification-oriented groups but also included the Society of American Foresters, the National Association of State Foresters, and a few traditional environmental groups. Finally, universities that have been among the first to establish active research programs in SF, or that have been influence leaders for some time headed the influence categories.

### 4.3. Motivating factors and possible outcomes

The low response rates and omissions in the L–K approach negatively affected our ability to perform certain analyses. Low responses from organizations in the federal sector raised questions about the validity and accuracy of conducting ordinations of influence structure and coalition membership. The findings would have been particularly useful in projecting strategic directions for sustainable forestry.

The Delphi results compensate for this limitation, however. According to the Delphi panel, SF appears to have moved beyond its roots in UN activities and third-party certification programs and has been subsumed into the broader and deeper debate about how, why, and for whom US forests will be managed. The three highest ranked motivating factors (dissatisfaction with past practices, societal interest in the environment, and the desire to sustain forests) have shaped the forest policy climate in the United States since the late 1800s. The incorporation of SF into this pre-established framework weakens claims that SF has hidden agendas or is a passing fad. Market forces appear to have little impact on motivating participation in the SF network: the panel ranked demand for certified products last among the nine possibilities. Mid-ranked motivators are worries that actions of others in the network will have negative impacts and dissatisfaction with past conflicts.

Our research on potential outcomes predicts that a mixed future is in store for sustainable forestry in the United States. At the federal level, it is estimated that changes will be confined primarily to the USDA Forest Service, to other federal agencies, and to the management of federal lands. State governments are deemed more likely than the federal government to implement new or to revise old policies that affect activities on private lands, and appear only slightly less likely than the USDA Forest Service to adopt new or to revise old policies and management practices for state lands. Despite projections that SF will have weak impacts on the market and demand side in the private sector, forest industry is projected to change its management and procurement practices in response to SF. NIPF owners are estimated to be the least likely to change. A slight majority projects that academic curricula, extension programs, and research directions will change due to SF.

The panelists' response to the potential outcomes further supports the observed parity in the distribution of influence among the sectors in the top quintile: activities for SF appear to be confined within the individual sectors at the present time. For example, changes at the federal level are projected to affect federal agencies and management; state level changes are projected to affect state agencies and management, etc. These findings should provide some encouragement for those in the private sector most worried about

government policy outcomes or other regulatory mandates resulting from SF.

### 4.4. Methodological issues

The Delphi surveys and the Laumann–Knoke approach overlapped. Delphi performed comparably to the L–K approach in each area. Seventy-seven percent of the individual organizations ranked in the top quintile by the L–K approach were also included in the top Delphi quintile. Further support for the methods' similarity is the lack of statistically significant differences between them in the distribution of influence. These outcomes support the conclusion that the Delphi can be a useful tool in network analysis applications. While of limited value in identifying communication patterns and coalition memberships, the technique can allow for consensus regarding potential outcomes, which may prove useful to political scientists interested in how issue networks function to make policy.

The results also suggest that traditional methods of issue network analysis are not as effective at characterizing an active issue network, at least at such a small scale and scope. Perhaps a merging of the two approaches can address the shortcomings of each for this particular application. Of course, one way to test the validity of this combined approach would be to track the actual policy outcomes and compare them to these projections. To increase the accuracy of such projections, however, one would need to define the issue or sub-issue of focus with a high level of clarity to reduce conflicts in interpretation as well as specify the type of policy change (tax, protective-regulatory, state, federal, etc.) anticipated. Our use of 'sustainable forestry' as an issue may have been too broad, and 'policy change' as an outcome may not have been specific enough to test this approach in the most robust manner.

## 5. Conclusion

An analytical framework was developed to meet the research objectives of (1) describing the sustainable forestry issue network; and (2) discerning potential public and private outcomes for SF given the network's characteristics. Review of the literature suggested that issue network analysis meets these objectives. Network analysis has traditionally been applied to describe how policy was made. Applying network analysis to an issue that had yet to generate policy action provided an opportunity to attempt something new.

The primary concerns with applying network analysis to an emerging issue were the usual low response rates that limit the ability to perform the necessary data analysis and the potential of the method to overlook important participants. Efforts to address these concerns led to applying the Delphi technique to the research problem. This again presented a research opportunity because the Delphi methodology had never been applied to network analysis research. Accordingly, the objectives of the study were expanded to include the testing of the hypothesis that the Delphi methodology could provide results comparable to network analysis.

Both methods were applied. The approach to issue network analysis developed by Laumann and Knoke (1987) was utilized. This entailed identifying the network's population and surveying it to determine: (1) the patterns of influence among network members; and (2) the number of and membership in the network's coalitions. The Delphi method required creating a panel of experts and using an iterative survey process to: (1) identify the network population; (2) identify the patterns of influence among the actors; and (3) estimate the likelihood of potential outcomes at the federal, state, and private levels. Results were generated in three areas: (1) methodology, (2) network character, and (3) potential outcomes for SF.

Results indicate that Delphi can produce results comparable to traditional methods of network analysis. Results predict that SF is likely to affect forest practices within individual sectors, but that broad scale policy actions are unlikely in the short term. Results also show that no single sector is dominant. Finally, the apparent absorption of SF into the broader debate over the management of public and private forests in the United States suggests that although the termi-

nology may be transitory, the philosophy of economically viable, environmentally sound, and socially responsible forestry may be with us for quite some time.

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# Forest Policy and Economics

Volume 2 (2001)

VOLUME 2/3–4 (2001)

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