

Pigs on the Plains: Institutional Analysis of a Colorado Water Quality Initiative

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Abstract: We used the Legal-Institutional Analysis Model (LIAM) and Advocacy Coalition Framework (ACF) to analyze the campaign over passage of the Colorado Hogs Rule, an initiative passed by the voters in 1998 to require regulation of swine production facilities in Colorado. Used in tandem, LIAM and ACF provided an opportunity to develop a robust understanding of the obstacles and opportunities that face water quality managers in a state-centered multi-organizational decision process. We found that combining the LIAM with the ACF enhanced the understanding that could be achieved by using either model in isolation. The predictive capacity of the LIAM would have been reduced without information from the ACF, and the ACF by itself would have missed the importance of a single-case study.

Keywords: policy analysis, coalitions, air quality, agricultural policy, voting, stakeholder assessment

Local control of natural resource policy has become increasingly important in the United States over the past decade, especially as reflected in the rise in ballot initiatives as a form of policymaking.^[1] In this article, we report on the institutional dynamics of the response to an initiative placed on the 1998

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ballot for the State of Colorado. The initiative was intended to regulate corporate hog farms, including those in the South Platte River drainage of Colorado.

We studied the campaign for passage of the Colorado Hogs Rule to understand the obstacles and opportunities that face decision-makers, political actors, and land managers in state-centered water quality management issues. To reach that understanding, we used two institutional analysis techniques: the Legal-Institutional Analysis Model^[2] and the Advocacy Coalition Framework.^[3,4]

Imperial^[5] defined institutional analysis as “the process of analyzing the design and performance of an institutional arrangement.” Ingram et al.^[6] identified four tasks of institutional analysis: identifying actors and their stakes, identifying resources actors can use to advance their interests, identifying the orientations of different decision arenas, and analysis of the means to overcome institutional impediments.

Institutional analysis is unique because it proposes “a more general explanatory theory” to predict and explain behavior.^[7] However, institutional analysis as applied to environmental policy, environmental conflict resolution, and environmental management has emerged as a field that holds great promise but remains under-developed. Ingram and her colleagues,^[8] and Ostrom^[9] proposed guidelines for improving institutional analysis. Imperial^[10] and others have argued that the shift toward ecosystem management has led to more comprehensive management processes and increased public involvement. To achieve the hoped-for results of ecosystem management requires explicit attention to “institutional design and performance.”^[11] Lamb and Ostrom^[12,13] argued that in many fields of policy, organizations consistently play roles as actors in “action arenas.”^[14] Consequently, the focus of institutional analysis should be on variables such as participants, positions, outcomes, action-outcome linkages, control exercised by the participants, and (perceived) costs and benefits to the actors.^[15]

Governmental and non-governmental organizations are often characterized as predictable in terms of how they approach problems, use information, make decisions, and present themselves to the public.^[16] Predictability may play out in organizational behaviors that can be expressed as roles. This is not a new idea. For example, Seidman^[17] suggested that “custom, culture, and role” affect how organizations behave and Wildavsky^[18] suggested that budget institutions typically play either a guardian or advocacy role.

The idea of organizational role in natural resource multi-party decision-making has been formalized in the Legal-Institutional Analysis Model.^[19,20] Originally used for instream flow decisions,^[21,22] the purpose of the LIAM is to use knowledge of past agency behavior to indicate the likely roles that may be played in a new decision process. Since, the decision-making model has been used for a wide variety of environmental negotiations, including negotiations at the United States/Mexican border.^[23,24] Developers of the LIAM have argued that organizational roles can be used to depict likely coalitions.^[25,26]

While the LIAM has some predictive capacity, it does not have the ability to identify specific coalitions, rather, it maps organizations based on the organizations' past policy positions and can show clusters of organizations based on these positions. Further, the LIAM has never been melded with another model to improve these limits.

The Advocacy Coalition Framework attempts to explain coalition dynamics over time. The ACF assumes that actors can be aggregated into a number (usually one to four) of "advocacy coalitions," each composed of people from various governmental or private organizations that share a set of normative and causal beliefs and engage in coordinated normative or standard-setting activity over time. These coalitions include not only interest group leaders but also agency officials, legislators from multiple levels of government, applied researchers, and perhaps a few journalists.^[27] While this model has been successfully applied to a number of cases,^[28] it is specifically designed to study organizations over a 10 year period, making it of limited use in specific shorter-term cases.

We attempted to identify obstacles and opportunities in a short-term example of natural resource decision-making by examining five questions: First, did the members of advocacy coalitions fall within the same categories of organizational role as defined by the LIAM? Second, what factors might explain instances when members of an ACF advocacy coalition were mapped outside of that coalition by the LIAM analysis? Third, can dynamics of the coalitions be identified by combining the LIAM and ACF analyses? Fourth, if members of an ACF advocacy coalition were placed in different LIAM categories, what factors might have contributed to coalition maintenance or disintegration? Fifth, was coalition maintenance actually a problem in this policy issue? We anticipated that by combining the analysis from the LIAM and ACF it would be possible to provide more detailed understanding of coalition structures and bolster coalition analysis in a single case study.

CASE HISTORY

The South Platte River basin in Colorado is an area that drains 19,020 square miles and covers the entire northeast corner of the state (Figure 1), including the Denver metropolitan area north to the Wyoming border. The headwaters of the basin begin in Wyoming and the central Rocky Mountains of Colorado. The river flows from the continental divide into Nebraska at the extreme northeast corner of Colorado, and is home to several municipalities, many irrigated farms, and a burgeoning number of animal feeding operations. One type of animal feeding operation, which is on the increase, is hog production.

Hog production is only one of many issues in the basin that, taken together, form a complicated arena for environmental management. There are 532 agencies with some form of decision-making power over land, water, and/

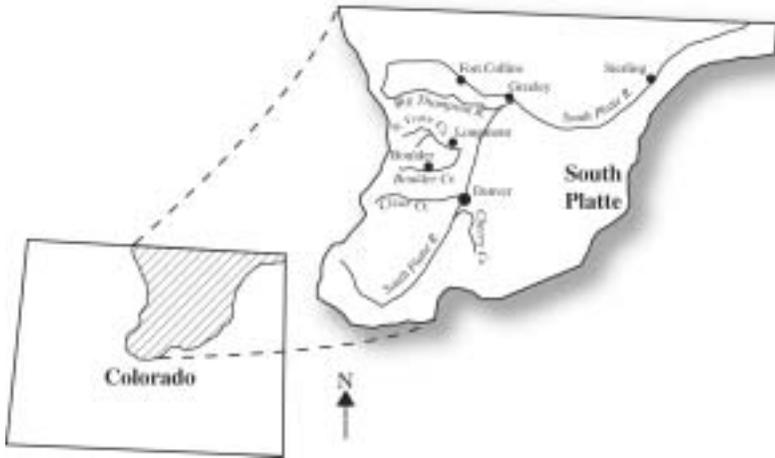


Figure 1. Map of Colorado showing the South Platte River Basin.

or air quality in the basin.^[29] Environmental issues include both point and non-point water pollution.^[30]

Managing hog feeding facilities has emerged in northeast Colorado as an important question because the manure from these operations releases potentially disease-causing organisms and is one form of non-point pollution in the basin. Because of this, the case of deciding on new water quality laws for hog management is important for understanding the institutional obstacles and opportunities that may be faced in setting natural resource policy in the context of a single-state, multi-agency, electoral decision process.

One example of the complex decision process in the South Platte River basin is a dispute over the water quality regulations governing hog feeding facilities that led to a ballot decision known as the Colorado Hogs Rule.^[31] The Colorado Hogs Rule was an initiative on the state-wide ballot in November 1998. The initiative established a new requirement that an individual discharge permit must be obtained by any person who operates, constructs, or expands a “housed commercial swine feeding operation” defined in the statute as “a feeding operation that is capable of housing eight hundred thousand pounds or more of live animal weight at any one time or deemed a commercial operation under local zoning and land use regulation.”^[32] The Hogs Rule is one of the few water quality laws in Colorado that is not federally mandated.^[33]

The Hogs Rule was enacted by the voters of Colorado to require large, corporate hog operations to cover waste lagoons to reduce smells and to take steps to ensure their facilities do not pollute water supplies. Unlike cattle feedlots, where manure is solid and can be trucked away, hog farms use large lagoons to hold manure washed from barns. This manure is a source of

disease-causing organisms potentially harmful to humans and of plant nutrients such as nitrogen and phosphorus.^[34] With passage of the Hogs Rule, Colorado voters added waste management and odor control rules covering hog farms to the state's water quality laws.

Supporters of the measure—including billionaire Philip Anschutz—argued that odor controls and water quality protection were long overdue and critical for protecting the environment.^[35] The Hogs Rule was captioned as Amendment 14 on the 1998 ballot and was coupled with Amendment 13. Hog producers created and supported Amendment 13, which would have made it illegal to impose regulations on only one livestock breed.^[36] By including all livestock operations, Amendment 13 exposed divisions among supporters of the initiatives, especially between the Colorado Pork Producers and Colorado Livestock Association.^[37] Although Amendment 13 failed to pass, the Hogs Rule was successful and entered the rule-making process.^[38]

The Colorado Department of Public Health and Environment was charged with promulgating the regulations and began the process by drafting preliminary rules and holding public hearings. Organizations such as the Rocky Mountain Farmers Union, Colorado Livestock Association, Environmental Defense Fund (name officially changed to Environmental Defense in 2000), and Colorado Farm Bureau participated in the rulemaking hearing held by the Department of Public Health and Environment in March of 1999.^[39] Official review of the regulations occurred in Spring 2002. While only a small number of organizations were active in the rule making process, many organizations, both those for and against the initiative, were active in the campaign to obtain passage of the Hogs Rule, the policy focus of our study.

METHODS

The Legal-Institutional Analysis Model

The LIAM is a decision analysis model designed to accomplish three goals:

1. help parties plan for participation in a negotiation,
2. predict organizational behavior, and
3. examine likely negotiation strategies.^[40]

The model categorizes stakeholders into categories of activists and allocators, which are conceived as orthogonal to each other and are laid out on a grid, which is often referred to as a role map. Activists are those parties who pull and haul for substantive advantage; the emphasis is on outcome. Allocators are parties that decide how to distribute benefits, and the emphasis is on process. Within those categories, the LIAM identifies roles. Organizational roles consist of activist and allocator elements. For example, an organization might

be a guardian-broker, an advocate-arbitrator, or some other combination of activist and allocator. The two activist roles are advocates and guardians. Advocate-guardian is a continuum that maps stakeholders' policy preferences.

Advocate organizations (often pro-environment) call for a change in the status quo approach to natural resource management.^[41] They may rely on "crusading" and data analysis to advance their position.^[42, 43] The factor that distinguishes the advocate from the guardian is that the former challenges an agency that seeks to impose a development, or economic progress philosophy on a project.^[44]

Guardians are most often resource developers. They attempt to protect themselves and their constituencies from interference. Guardians are interested in preventing challenges to their routines or plans and work against change in management practices or project design.^[45] They often prefer economic approaches and traditional decision processes.^[46]

The two allocator roles are arbitrators and brokers. Broker-Arbitrator is a continuum that maps the preference for *type* of decision process. Arbitrators are organizations that have statutory authority to establish the guidelines for preparing management plans or direct the implementation of the plans to the subordinate agencies.^[47] Organizations that score high on the arbitrator scale often prefer formal processes, rely on data collected by others, and make or prefer to have someone make authoritative allocations after a presentation of evidence from all sides.^[48] Brokers, on the other hand, are organizations that have the ability to facilitate bargaining or prefer that decisions are made through negotiation.^[49] In bargaining, they tend to rely on cost-benefit analysis, resource ownership, and political processes.^[50] The broker-arbitrator and advocate-guardian roles are mapped on scaled continua (i.e., the grid) to indicate the degree of adherence to each role (see Figure 2).

The placement of the actors on the LIAM role map is the result of answers given by respondents to Likert-scaled queries in a computer-generated questionnaire. The questionnaire is designed to graph responses based on answers to 30 questions (each having a value in the range of 0–4).^[51] Respondents answer questions about individual organizations and scores are averaged to identify the roles of each organization being analyzed.

The LIAM also assesses organizations in terms of influence or power. Relative power helps shape behavior.^[52,53] Organizational power as expressed in the LIAM can be of three types: information, resources, and support. Information power is derived from the organization's knowledge and expertise. Resources power focuses on the available personnel, funding, experience, and legal authorities. Support power is based on the size, cohesiveness, and effectiveness of an organization's constituency.^[54,55] Each type of power is ranked from 1–4, with 4 indicating the highest level of power.

The users' manual for the LIAM recommends that the model be used to map organizations on specific issues and that the results not be generalized to behavior in other decision contexts.^[56] For example, an organization that is usually an advocate may play the role of a guardian on another particular issue.

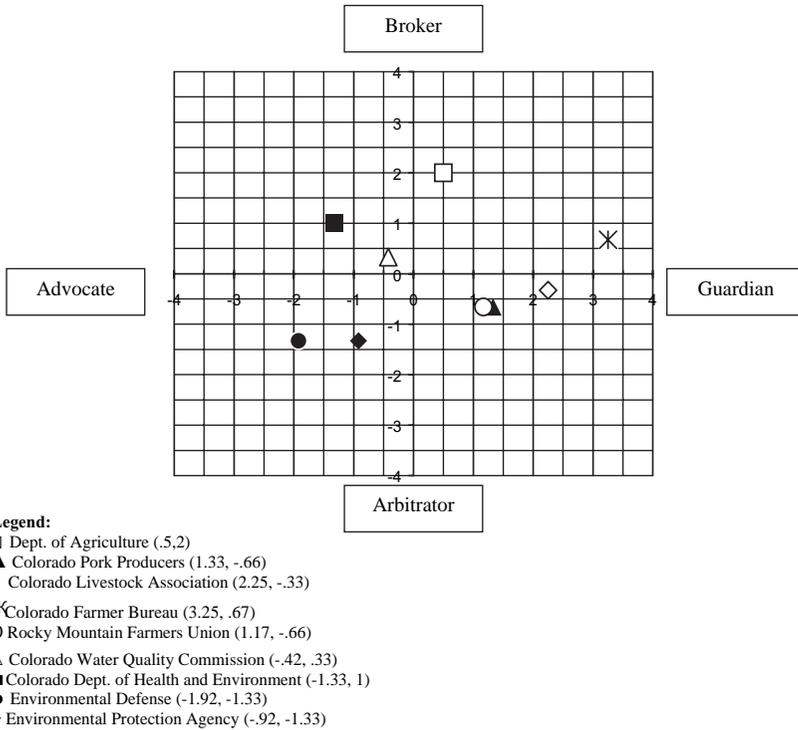


Figure 2. LIAM role map of the Expert Panel assessment of parties in the Colorado Hogs Rule campaign.

To apply the LIAM to the Hogs Rule, we used Lexis-Nexis articles from Denver, Colorado newspapers in 1998 to determine which organizational actors were most often mentioned in connection to the Amendment 14 campaign. The result was a list of actors that were influential or involved in the Colorado Hogs Rule debate. To ensure that we had a complete list of involved organizations, we also interviewed the director of the Air Pollution Control Division at the Colorado Department of Public Health and Environment. We then cross-referenced the organizations identified from our interview with those most mentioned in media reports. Finally, we identified six experts in the field who had research experience or direct involvement in Colorado environmental policy and were familiar with all selected organizations. We asked this expert panel to complete the LIAM questionnaire for each organization. The software automatically entered the results into the LIAM model.

Members of the expert panel represented government agencies or were academics specializing in soil and agricultural sciences. Rather than relying on the perceptions of stakeholders, as had been done in earlier LIAM analyses,^[57] the expert panel allowed data collection to be founded on more

in-depth and overarching experience, which we expected would provide more accurate perceptions and control for bias from the winning and losing parties.

The Advocacy Coalition Framework

The Advocacy Coalition Framework is designed to analyze group structures and their effect on policy formation.^[58,59] Much like the advocate-guardian continuum on the LIAM, the ACF looks for coalitions formed through shared values, which affect the coalitions' policy preferences. The variables in the ACF include endogenous factors such as the basic constitutional structure, sociocultural values, and natural resources of a political system. The Advocacy Coalition Framework is based on the assumption that these traits are extremely resistant to change and are seldom the subject of coalition strategies, yet clearly affect behavior.

Other variables are those exogenous to a subsystem. They include:

1. major socioeconomic changes, such as economic dislocation or the rise in social movements;
2. changes in the systematic governing coalition, including "realigning" elections; and
3. policy decisions and impacts from other subsystems, such as changes in tax law.

These factors are more likely to change over the course of a decade or so. The ACF posits that these factors are critical prerequisites to major policy shifts.^[60]

According to Sabatier and Jenkins-Smith,^[61] the ACF framework is organized into a hierarchical tripartite structure, with higher/broader levels constraining more specific beliefs. At the highest/broadest level is the deep core of the shared belief system; these are basic normative beliefs such as individual freedom versus social equality. At the next level are policy core beliefs, which represent a coalition's basic normative commitments and causal perceptions across an entire policy domain or subsystem.^[62] They include fundamental value priorities, such as the relative importance of economic development versus environmental protection, and the appropriate division of authority between governments and markets. This middle level fits well with the LIAM, which becomes a systematic way to expand the more descriptive qualities of the ACF. The AFC asserts that the policy core, not the deep belief core, is the glue that holds coalitions together.

Finally, the secondary aspects of a coalition's belief system consist of a large set of narrower (i.e., typically less than system-wide) beliefs concerning the seriousness of the problem, policy preference regarding regulation or budgetary allocations, the design of specific institutions, and the evaluation of various actors' performance.^[63]

Sabatier and Jenkins-Smith^[64] explained that strategies from various coalitions may be mediated by a third, unaffiliated group of actors called policy brokers. The principal concern of policy brokers is to find a compromise. This is similar to the broker role in the LIAM. Any coalition, over time, can change some of its beliefs (usually secondary beliefs) and/or alter its strategies. Because strategies are important for advocacy coalitions, they may be considered in concert with analytical models that share some of the same characteristics as the ACF, such as the LIAM.

Melding the Two Models

Sabatier^[65] suggested that in environmental issues two advocacy coalitions are currently active in the United States: clean environment and economic feasibility. Although advocacy coalitions are usually identified through testimony or vote analysis after a decision has been made, we identified two advocacy coalitions from the list of organizations selected for LIAM analysis that were consistent over time and fit Sabatier's typology. As described in the ACF, the clean environment coalition is usually dominated by environmental and public health groups, while the economic feasibility coalition is usually dominated by industry or agriculture.^[66]

For the Hogs Rule, the advocacy coalitions were labeled as the clean water coalition and agriculture coalition.^[67] We initially labeled all agricultural or industry groups as members of the agricultural coalition and all environment or public health groups as the clean water coalition. By considering advocacy coalitions in one specific issue we followed the work of Marzotto and others,^[68] who divided advocacy coalitions into three subsystems related to mobile air pollution and employee commute options (ECOs) that derived from the Clean Air Act Amendments of 1990. Although these coalitions are not the only potential groupings in environmental policy questions, they are often referred to as "communities of interest" by the Department of Agriculture^[69] and have a history of activity in Colorado. Because of the continuity of these coalitions, we anticipated that members of the clean water coalition would be scored as advocates in the LIAM while members of the agriculture coalition would be scored as guardians.

We melded the two models by plotting the organizations as they were originally placed by the expert panel on the LIAM role map without reference to coalition (Figure 3) and then coded the organizations, via the ACF, as members of either the clean water or economic feasibility coalition. We displayed the advocacy coalitions on the LIAM role map to show coalition membership in reference to the Colorado Hogs rule (Figure 4).

The coalitions were derived by placing those organizations that questioned the economic feasibility of Amendment 14 (i.e., argued that the Amendment would be too costly to the economy and alternatives should be considered) as members of the economic feasibility coalition and those who

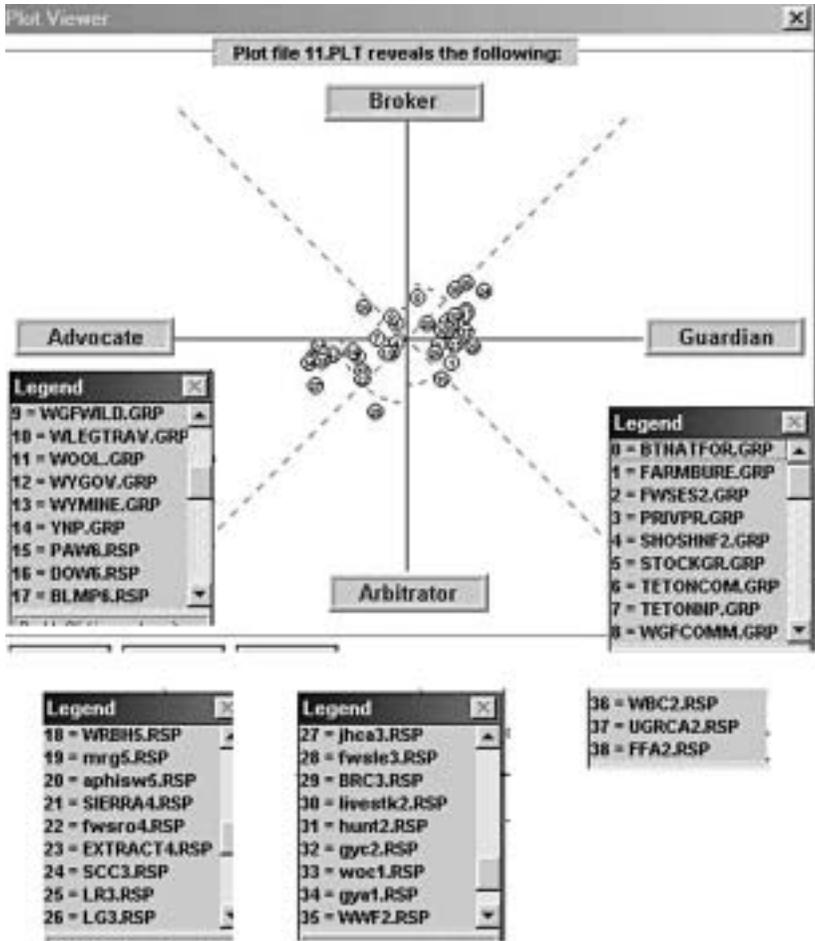
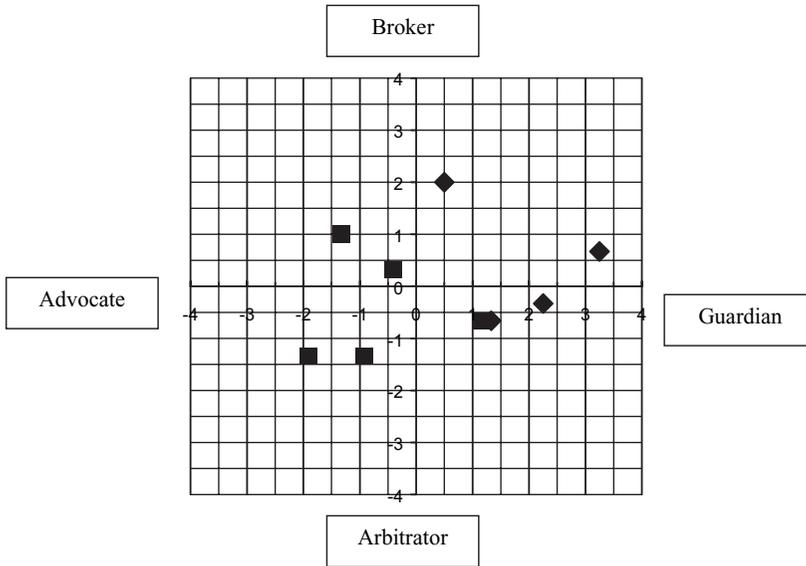


Figure 3. Example of an LIAM role map.

argued that housed commercial swine feeding operations pollute water to the extent that they must be regulated as members of the clean water coalition. When we combined the ACF coalitions with the LIAM role map (Figure 4) the results showed that all advocate organizations as well as the Rocky Mountain Farmers Union—although a traditional guardian organization—were members of the clean water coalition.

To analyze the power relationships between the coalitions, we summed the total LIAM power scores for each coalition and normalized the LIAM power scores by assigning each coalition its percentage of the total power score. In the LIAM, each organization has a potential of 12 power points. Table 1 displays the distribution of power points for each organization according



Legend:

- ◆ Agriculture Coalition
 - Department of Agriculture
 - Colorado Port Producers
 - Colorado Livestock Association
 - Colorado Farm Bureau
- Clean Water Coalition
 - Rocky Mountain Farmers Union
 - Colorado Water Quality Commission
 - Colorado Department of Health and Environment
 - Environmental Defense Fund
 - Environmental Protection Agency

Figure 4. Results of combining the ACF coalitions with the LIAM role map showing that one member of the clean water coalition was graphed by the Expert Panel as a guardian.

to their scores in the resources, information, and support categories. The power scores for each Hogs Rule coalition are also displayed in Table 1.

FINDINGS

Our examination using the ACF led to expectations that the coalitions would be differentiated between advocate-based and guardian-based orientations on

Table 1. LIAM Power Scores by Organization

Organization	Resource Power	Information Power	Support Power	Total Power Points
Colorado Livestock Association	2.00	3.25	3.00	8.25
Colorado Pork Producers	1.88	3.00	3.22	8.10
Colorado Department of Agriculture	2.50	3.25	3.11	8.86
Colorado Farm Bureau	1.38	2.25	3.33	6.96
Rocky Mountain Farmers Union	1.63	2.00	1.89	5.52
Colorado Water Quality Commission	2.88	4.00	2.56	9.44
Environmental Defense Fund	0.38	3.25	1.89	5.52
Environmental Protection Agency	3.50	2.75	3.78	10.03
Colorado Department of Health and Environment	2.00	3.25	3.11	8.36
Economic Feasibility Coalition (general)	9.39	13.75	14.55	Power Score: (.53) 37.69
Clean Water Coalition (general)	8.76	13.25	11.34	Power Score: (.47) 33.35
Economic Feasibility Coalition (Hogs Rule)	7.76	11.75	12.66	(.45) 32.17
Clean Water Coalition (Hogs Rule)	10.39	15.25	13.23	(.55) 38.87

Scores are given for each power element (resources, information, and support) and the total power score is displayed; total possible power score is 12.

the LIAM role map. From the ACF we expected all the agriculture-oriented organizations to be part of the agriculture coalition and the environment-oriented organizations to be part of the clean water coalition. Analyzed in this way, the agriculture coalition would have had a relative power score of 0.53 while the power score for the clean water coalition would have been 0.47 (Table 1).

The strength of organizations within the expected agriculture coalition was similar. The Colorado Livestock Association, Colorado Pork Producers, and the Colorado Department of Agriculture each received scores between 8.0 and 9.0 on the 12-point scale (Table 1). The Colorado Farm Bureau was somewhat less powerful, with a score of just under 7.0, while the Rocky Mountain Farmers Union was the least powerful. Within the clean water coalition, there was more variety with the Colorado Water Quality Commission, U.S. Environmental Protection Agency, and the Colorado Department of Public Health and Environment scoring between 8.0 and 10.0. Although the Colorado Department of Public Health and Environment claimed neutrality on the Hogs Rule, Patty Shwayder, director of the organization in 1998, stated “we need to get something in place quickly, (Amendment 14) is probably a good idea.”^[70] Due to their public support of the Amendment, we placed the Department in the “clean water” coalition. The Environmental Defense Fund was rated as less powerful (Table 1).

As expected, the LIAM role map (Figure 3) resulted in an array of organizations differentiated along the advocate-guardian continuum. But when we looked at actual behavior in the Hogs Rule debate, one agricultural organization—the Rocky Mountain Farmers Union (which represented many organizations of smaller farmers)—was clearly associated with the clean water coalition.

Although in the LIAM analysis (Figure 3) the Rocky Mountain Farmers Union was positioned immediately next to Colorado Pork Producers and would have been expected to be part of the agriculture coalition, the Farmers Union worked for passage of the amendment.^[71] Small operation farmers—those who house fewer than eight hundred thousand pounds of live animal weight—and rural residents backed the Hogs Rule throughout eastern Colorado. Both of those groups were represented by the Rocky Mountain Farmers Union,^[72] which joined with the environmental groups to constitute the clean water coalition. Many merchants in rural towns, hog farm employees, and the Colorado hog industry were against the proposed amendment, claiming they would be “seriously harmed by Amendment 14” due to the extreme cost of clean-up.^[73] These groups were largely represented by organizations such as the Colorado Pork Producers, Colorado Livestock Association, the Colorado Department of Agriculture, and Colorado Farm Bureau. The division between corporate hog farms and small operation farmers has been attributed to differences in socio-economic conditions.^[74] The small operation farmers were not affected by the amendment and felt that large-operation facilities should be regulated more closely.^[75]

The power scores for the two coalitions shifted when the Farmers Union was added to the clean water coalition. Although the Farmers' Union was not in itself very powerful (tied for the lowest individual power score of 5.52 out of a possible 12 points; Table 1) and the clean water coalition contained the two lowest-scoring organizations, the balance between the two coalitions was substantially altered, with the relative power score of the agriculture coalition at 0.45 and the clean water coalition at 0.55.

DISCUSSION

One reason the Rocky Mountain Farmers Union's stance on the Hogs Rule initiative was significant for the clean water coalition was that it became a leading organization within the coalition. David Carter, president of the Rocky Mountain Farmers' Union, helped draft the language of Amendment 14.^[76] The leadership of the Farmers Union within the clean water coalition helped ameliorate coalition maintenance problems that might have been anticipated in a group that spanned the advocate-guardian divide.

Although the largest difference in power scores was evident in terms of resource power (0.43:0.57), neither coalition was rated as possessing extensive resources such as money, staff, or legal control (Table 1). The clean water coalition was also rated as more powerful in terms of information (0.44:0.56) and one of its members was scored very high indeed, with an average score of 4.0. But the agriculture coalition was also rated quite high in information with an average coalition score of nearly 3.0.

The small difference in relative support power may have made the most difference in the outcome. The relative score for the agriculture coalition was 0.49 while support power for the clean water coalition was 0.51. The clean water coalition contained both organizations with the lowest support power (Farmers Union and Environmental Defense Fund) and highest support power (Environmental Protection Agency). This diverse membership increased the clean water coalition's support and broadened the base from which quality solutions may arise.^[77]

Core beliefs—a critical factor in ACF—were a crucial element in establishing a more diverse clean water coalition. Small farmers favored the Amendment because they were worried that hog farms would pollute groundwater, upon which they depend for survival.^[78] The agricultural split was also due to corporate hog farms being perceived by many small farmers as primarily driven by short-term corporate profits rather than the concerns of farming. The perception among small farmers was that these corporate operations would drive away local competition and pollute ground water.^[79] The clean water coalition was formed by a nexus of interests in which the core values of environmental concern and economic sustainability played a part. The traditionally guardian-oriented small farmers favored the clean water coalition because that promoted their self-preservation.

Instead of guarding the status quo, as many guardians would, the Farmer's Bureau was more concerned with the core belief of guarding their livelihood.

Another factor contributing to a guardian joining an advocate-based coalition was the bitter history between small and large-scale farmers over environmental protection issues. Before the passage of Amendment 14, corporate owners of hog farms blocked passage of environmental protection by the state Legislature.^[80] The pork industry was also behind Amendment 13, an attempt to trump any success Amendment 14 may have by making any law directly aimed at one sector of livestock illegal.^[81]

Although the ACF provided a more complete description of the structure of the coalitions, there were some dynamics of the Hogs Rule coalitions that could be best identified from the LIAM analysis. First, outliers to general policy preference were evident. Second, negotiation strategies for each individual organization could be anticipated, and, finally, coalition maintenance became easier to examine through studying negotiation preferences.

First, it was evident that the Rocky Mountain Farmers Union was an outlier in the model. While all other organizations coded as "clean water" were on the Advocate side of the graph, the Farmers Union, also coded as a member of the clean water coalition, was located on the Guardian (opposite) side of the map (Figure 4). As calculated by the power scores (Table 1), this was a crucial factor in terms of relative power of the clean water coalition over the economic feasibility coalition. While most of the public that supported the Rocky Mountain Farmers Union sided with the Hogs Rule initiative, this outlier would not have been apparent without the overlapping of the two models.

In this case, adding the analysis of advocacy coalitions to the study served as an accuracy check on the LIAM analysis and as a reminder that LIAM roles are sensitive to specific cases. While the Rocky Mountain Farmers Union can be expected to act as a guardian in most decision contexts, which is where the expert panel placed it, in this case the need to protect small farmers through collective action made the organization a temporary advocate. Further, there may be some long-term implications of the Farmer's Union having worked on the Advocate side. Our findings suggest that it may become easier for Advocates on other environmental issues to approach the Farmer's Union in the future, creating a new dynamic in the decision-making arena.

Second, the LIAM allowed us to examine the negotiation strategies of the organizations chosen. Although the LIAM is usually used in collaborative, inter-organizational decision processes, we used the LIAM to study coalitions in a ballot issue. Because organizations did not have to compromise with regard to Amendment 14, the implications of the distinction between the arbitrator and broker roles were not so immediately evident. However, it seems likely that during the campaign some organizations may have preferred to resolve differences in the proposed rule through negotiation while others sought an arbitrated resolution—in this case, a ballot initiative. The fact that organizations were widely separated on the advocate-guardian scale indicates that wide value

differences existed and may have led to competitive strategies during the Hogs Rule campaign. The coalitions may not have actually bargained, but they certainly made use of strategy, relied on the support of other coalition members and the public, and used their available power to influence the process.

Third, although the clean water coalition contained advocate and guardian members, maintenance of continuity and consistency was probably made easier because almost all members favored the arbitrator role and there was general agreement about the desired outcome of the process. Even the Colorado Water Quality Commission was only a very weak broker. Coalition members wanted a decision by the voters (followed by an authoritative rule-making). The agriculture coalition was somewhat less well settled in this regard. The Colorado Farm Bureau and to a greater extent the Colorado Department of Agriculture favored a brokered decision while the other two members were inclined to look toward an arbitrator.

CONCLUSION

Combining the LIAM with the ACF enhanced the understanding that could be achieved by using either model in isolation. On the one hand, using the LIAM alone in the Hogs Rule case would have missed an important element of coalition structure. The predictive capacity of the LIAM would have been reduced without information from the ACF, because relying on general or even historical roles would have led to an inaccurate description of the coalitions. On the other hand, LIAM allows analysts to assess the ACF placements by systematically assigning roles. The ACF by itself would have missed the importance of a single-case study, most likely grouping all members of the agriculture coalition together, and negotiation strategies for decision-making processes would have been left out completely.

While this article only investigates one case study, the findings may be applied to other case studies in which coalitions form around one specific policy action. More cases must be examined before any general patterns emerge, but our study implies the two models are reinforcing and aiding in predictive capabilities when used together on a single case study. With an increasing number of natural resource and environmental problems being addressed at the local organization level, the study of efficient group cooperation and new methods to bring institutions together becomes an ever more important aspect of the decision-making process for both financial and practical purposes. The evaluation of organizations' power scores gives organizations insight into the process of coalition building and may lead some organizations to seek non-traditional allies depending on the policy topic. Likewise, by combining the LIAM and the ACF, organizational members and consulting government officials may develop a more efficient way to communicate by seeing each individual groups' values within a cooperative decision-making arena.

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