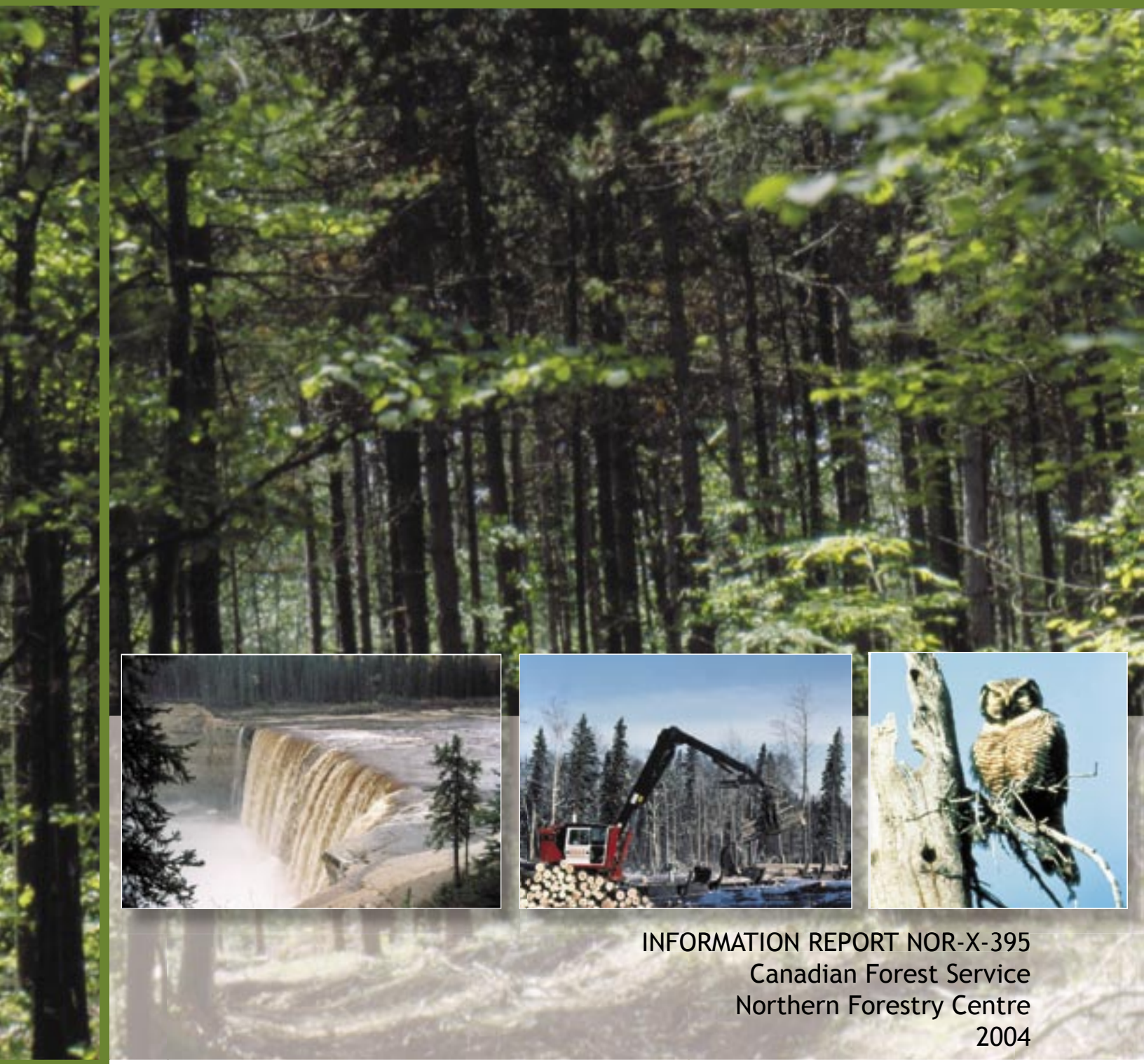
Assessing Prairie Forest Policy Networks and Policy Oriented Beliefs

A.M. Wellstead, D.J. Davidson, and R.C. Stedman



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Canadian Forest Service
Northern Forestry Centre
2004

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ABSTRACT

In this study, two policy process models or frameworks are examined with a view to understanding policy-related responses in the Prairie forest sector: the policy community – network approach and the advocacy coalition framework. A questionnaire was sent to 851 governmental and societal decision makers in the agriculture, forest, and water resource sectors. The survey examined existing policy communities and policy networks, as well as policy-oriented belief structures. Three hundred and fifty-six usable responses were obtained. The forestry respondents relied strongly on similar organizational types for their information and policy viewpoints and considered these organizational types as allies. Environmental agencies, on the other hand, were considered as sources of opposition. A large and dominant advocacy coalition found within the Prairie forest policy community consisted of respondents from both levels of government and the forest industry. Environmental respondents represented the only distinct coalition in terms of its policy-oriented belief structure.

RÉSUMÉ

La présente étude examine deux modèles ou cadres d'élaboration des politiques afin de mieux comprendre les orientations stratégiques données au secteur forestier des Prairies : l'approche des communautés et des réseaux d'orientation stratégique et le cadre mis en place par les coalitions militantes. Un questionnaire a été envoyé à 851 décideurs au niveau gouvernemental et sociétal dans les secteurs de l'agriculture, des forêts et des ressources en eau. L'enquête sondait les communautés et les réseaux d'orientation stratégique ainsi que les structures des convictions en matière d'orientation stratégique. Trois cent cinquante-six réponses utilisables ont été obtenues. Les répondants du secteur forestier s'en remettaient fortement à des types organisationnels similaires pour obtenir leur information et formuler leurs points de vue en matière d'orientation stratégique et ils considéraient ces types organisationnels comme des alliés. En revanche, les organismes environnementaux étaient considérés comme des sources d'opposition. Une coalition importante et dominante de la communauté d'orientation stratégique du secteur forestier des Prairies se composait de répondants issus des deux niveaux de gouvernement et de l'industrie forestière. Les répondants du secteur de l'environnement constituaient la seule coalition distincte pour ce qui est de la structure des convictions en matière d'orientation stratégique.

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INTRODUCTION

According to political scientists and political sociologists, external stimuli, such as scientific information or environmental events, is filtered through decision makers' beliefs and attitudes, which in turn develop through personal experience and within the organizational settings and relationships of a particular sector. An understanding of these beliefs is important when investigating the potential for policy-related responses to a relatively new issue such as climate change.

This study examines possible factors affecting policy-related responses to climate change from the forest sector. Its aim was to examine whether policy networks and policy belief structures observed in the policy communities of the Prairie provinces were consistent with related findings in the literature. The data are from an online survey of 356 "policy actors." The two policy frameworks that were employed, policy community – policy network analysis and the advocacy coalition framework (ACF), are outlined in the next section of this report. The third section details the study's methods and the data collected, and the fourth section examines the survey results, including an empirical examination of the organizational networks among policymakers is presented. A significant portion of that section is dedicated to a comparison of the beliefs of policy actors, particularly those from within the forest sector. The final section discusses the implications of the findings and makes recommendations for future research. In that section, two hypotheses are developed to examine the unique nature of Canadian resource-based policy communities.

- Hypothesis 1: In any natural resource sector with an asymmetric division of federal responsibilities, actors from within the policy community will identify federal government departments as brokering organizations.
- Hypothesis 2: If a policy community related to industries based on natural resources (such as forestry) is characterized by public resource ownership and dominated by a single government regulatory agency, and there is a low degree of environmental conflict, then a single homogenous system of policy core beliefs will dominate that policy community.

The first hypothesis is used to investigate the network of interactions among Prairie policy actors in all three sectors, and the second considers the beliefs of forest policy actor's.

PREVIOUS STUDIES

Policy-making occurs within a complex system of issues and is carried out by actors with various capacities (Lindquist and Wellstead 2001). Smith (2000) argued that no state agency has the resources to address issues single-handedly. Rather, such agencies are dependent upon the cooperation and resources of other actors. For this study, two bodies of policy research scholarship we used to characterize the policy-making system and potential political responses: policy community – policy network analysis and the ACF, both discussed in more detail below. These complementary approaches have been adopted in other sector-based research.

A policy community is the structural configuration of the actors who participate in the policy process within a particular sector (Pross 1986). More specifically, Coleman and Skogstad (1990, page 25) have described a policy community as including "all actors or potential actors with a direct or indirect interest in a policy area or function who share a common 'policy focus,' and who, with varying degrees of influence, shape policy outcomes over the long run". A given policy community consists of two segments: the subgovernment and the attentive public. The subgovernment is at the center of any policy community. It includes senior government personnel in positions of direct responsibility for a particular policy sector and nongovernmental organizations, such as producer groups, that have become established day-to-day participants in policy formulation and implementation. The attentive public consists of actors who are capable of influencing policy but who do not participate in policy-making on a regular basis. This group might include pressure groups, professional organizations, other government departments, and international organizations and governments.

While the concept of a policy community is used to identify and classify the actors involved in the policy process, the concept of a policy network is used to describe relationships between governmental and nongovernmental actors (Lindquist 1992). The policy network approach adopted within Canadian political science differs from the social network approach traditionally used by sociologists. The distinction is

important because these approaches represent different theoretical contexts. Nonetheless, both approaches were considered in this study.

The network approach that has been adopted by Canadian political scientists uses a metaphorical method to describe the types of relationships that exist among policy actors. This approach has spawned a large body of literature describing a variety of government – organization relationships based on such factors as resources, degree of institutionalization, and rules of conduct (Coleman and Skogstad 1990; Lindquist 1992; van Waarden 1992; Howlett and Rayner 1995; Howlett and Ramesh 2003). Coleman and Skogstad (1990) developed a classification of policy networks based on government and societal powers and organizational capacity. Pluralist policy networks are those involving many actors. They can be characterized by the dispersal of power from both government and society (pressure pluralism), either when societal actors are disorganized (clientele pluralism) or when organized interests are dominant (parentaela pluralism[1]). In closed policy networks, the second major type, policy-making is concentrated within a small group of government agencies and one (concertation) or two or more (corporatist) societal organizations. Howlett and Rayner (1995) argued that the policy network within the Canadian forest sector is best described as closed. The state-directed policy network, the third type described by Coleman and Skogstad (1990), is characterized by highly autonomous, coordinated government agencies that dominate the policy-making process.

For sociologists, a network refers to communications in small groups and in large organizations (Atkinson and Coleman 1993). Such analysis often involves formal methods for calculating the strength of linkages between individuals and/or organizations. There may be a variety of linkages between the roles occupied by social actors and the relations or connections between those positions (Knoke 1990). Such analysis provides a sense of interdependence between actors (Kenis and Schneider 1991). Political scientists who undertake research in this area (largely European and American) have sought to empirically investigate the power relationships between various actors in terms of their influence, communication, and reputation. By measuring these linkages, researchers have been able to identify webs and clusters of organizations sharing similar relationship characteristics (Schneider and Werle 1991; Knoke et al. 1996).

The policy community – network approach provides a way of systematically characterizing the structural relationships among a vast array of organizational and individual actors. This approach fits quite well with another body of research that explains the dynamics of policy change. The ACF, originally developed and subsequently enhanced by Sabatier (1988) and Sabatier and Jenkins-Smith (1993, 1999), sets out to examine the process of policy change within a policy community over a long period of time (a decade or more). According to Jenkins-Smith (1988), most policy models highlight the clash of political interest and the exercise of influence. However, the mobilization of information and analysis plays an equally significant role in shaping public policy and in policy debate (Jenkins-Smith 1988). The ACF approach stresses the accumulation and use of information by policy actors as a key element of policy change. Policy actors' beliefs serve as perceptual filters in the receipt of information (Schlager and Blomquist 1996).

The ACF approach has four key features (Fig. 1). First, events external to the policy community influence major shifts in policy direction and constrain the actions of the policy actors. Second, measuring the impacts of policy change and policy learning requires a time perspective of a decade or more. Third, policy change is best understood through the examination of what Sabatier and Jenkins-Smith (1993) refer to as policy subsystems. As in a policy community, a policy subsystem comprises 20–30 organizations with two to four key competing coalitions. In the present study, the term "policy community" is substituted for Sabatier and Jenkins-Smith's policy subsystem. Often, one organization serves as a broker between competing coalitions. Finally, public policies can be conceptualized as being part of policy-oriented belief systems (Table 1). What distinguishes advocacy coalitions from each other is a three-level hierarchical belief system. In other words, "coalitions seek to translate their beliefs into public policies and programs" (Sabatier and Jenkins Smith 1999). This belief system is arranged according to three distinctive categories: a deep normative core, a policy core, and secondary aspects. Each element of the ACF belief system is examined below.

Deep normative core beliefs are equated with the personality of an individual and are nearly impossible to change. A person's valuation of individual freedom in relation to social equality is an example of a deep normative core belief. Such beliefs are common across all sectors. The policy core is the basic strategy that a particular policy coalition advocates for achieving an environment congruent with its members' normative beliefs.

[1]Parentaela pluralism arises when organized interests gain a dominant place within a governing political party that, in turn, has members in prominent bureaucratic positions.

A change in beliefs pertaining to the policy core is possible but difficult. If the policy core beliefs are in dispute over a long period (greater than a decade), the lineup of allies and opponents tends to be stable (Sabatier and Jenkins-Smith 1993). Actors will show substantial consensus on issues pertaining to the policy core and less consensus on secondary aspects, the instrumental decisions and information searches that are necessary to implement the policy core. It is at the level of secondary aspects that most policy changes occur, since such changes are not as threatening to the coalition's policy core beliefs. As a result, actors are willing to give up these aspects more readily. A statutory revision is an example of a change at the secondary aspect level.

Changing the policy core value of a coalition's belief system eventually alters the basic perception and policy prescription (Jenkins-Smith 1988). But as long as the dominant advocacy coalition remains in power within the subsystem, the fundamental attributes of a government program are unlikely to be significantly revised. Changing policy core beliefs requires significant perturbation external to the subsystem, such as changes in socioeconomic conditions, changes in the systemic governing coalition, or a change in public opinion. Sabatier and Jenkins-Smith (1993) identified policy-oriented learning between actors as an important process within policy subsystems. Such learning can occur within a coalition and among competing coalitions.

A number of policy scientists have used the ACF in their empirical research in areas such as airline regulation (Brown and Stewart 1993), water supply policy (Munro 1993), natural gas policy (Weyent 1988), and forest policy (Lertzman et al. 1996; Wellstead 1996; Burnett and Davis 2002).

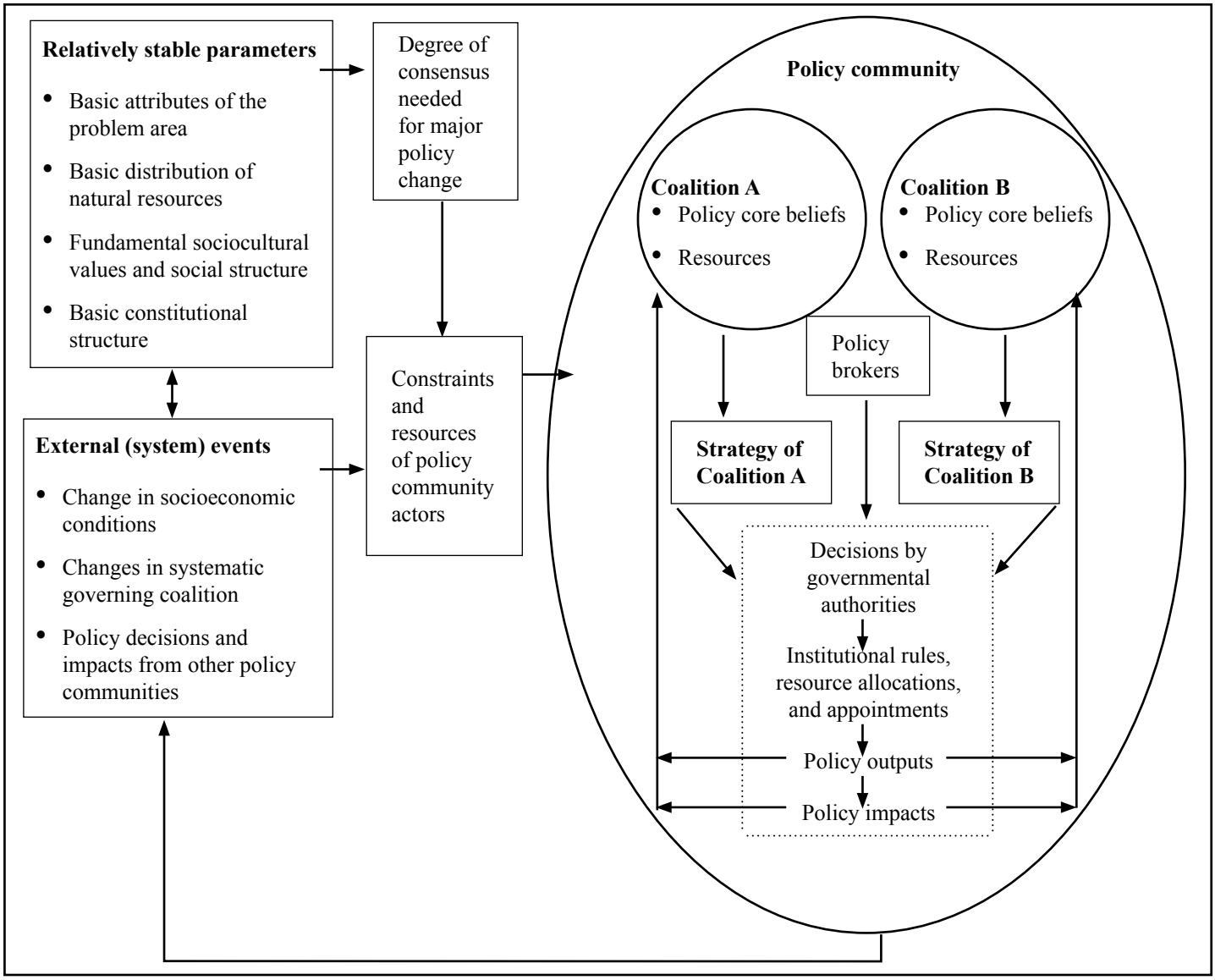

Figure 1. The advocacy coalition framework. Adapted from Sabatier and Jenkins-Smith (1999).

Table 1. Structure of belief systems of the "policy elite"[a]

Defining characteristics	Deep normative core (fundamental normative and ontological axioms)	Policy core (fundamental policy positions concerning basic strategies for achieving core values within a policy community)
Scope	Across all policy communities	Within a policy community
Susceptibility to change	Very low	Low, but change can occur if experience reveals serious anomalies
Illustrative components	Human nature • Inherently evil or socially redeemable • Part of nature or dominant over nature • Narrow egoist or contractarians[b] Relative priority of various ultimate values: freedom, security, power, knowledge, health, etc. Basic criteria of distributive justice (Whose welfare counts?); relative weights of self, primary groups, all people, future generations, nonhuman beings Sociocultural identity (e.g., ethnicity, religion, gender, profession)	Fundamental normative precepts • Orientation on basic value priorities • Identification of groups or other entities whose welfare is of greatest concern Precepts with a substantial empirical component: • Overall seriousness of the problem • Basic causes of the problem • Proper distribution of authority between government and the market • Proper distribution of authority among levels of government • Priority accorded to various policy instruments • Ability of society to solve the problem • Participation of public, experts, elected officials • Policy preferences

[a]Adapted from Sabatier and Jenkins-Smith 1999.
[b]Contractarians can be defined as those who advocate that any act is moral as long as all suitably informed, competent concerned parties voluntarily agree.

METHODS

The data for this study come from responses to an online survey of the policy community actors within the agriculture, forestry, and water resource sectors of Canada's three Prairie provinces, conducted in the winter of 2001–2002. The study population encompassed all those in a recognized position of influence, including senior provincial and federal government personnel, managers and directors of producer groups, Crown agencies, environmental and conservation groups, First Nations groups, consultants, and academics. Because of the small size of the study population, the entire population, rather than a random sample, was surveyed. In the case of federal agencies such as Agriculture Canada, Environment Canada, and Natural Resources Canada, key Ottawa-based headquarter personnel were also surveyed. Participants were identified by methods similar to those employed by Laumann and Knoke (1987) and Sabatier and Zafonte (1995). Potential participants were initially identified through an extensive search of organizations' web pages or telephone directories (or both). In most cases, an e-mail directory of key personnel such as directors and managers was readily available. All of the participants from federal and provincial government agencies and practically all respondents from other organizations (see Appendix 1 for complete list) had unique personal workplace e-mail addresses. The few groups that did not have web-based directories were contacted directly. Additional respondent lists were derived from participants in key federally and provincially sponsored policy-related studies conducted in the past 5 years. Finally, a "snowball" technique was used, whereby key individuals were approached and asked to identify other organizations that should be contacted. The authors were confident that most, if not all, of the organizations within the three policy communities (agriculture, forestry, and water resources) were identified and contacted.

The survey process consisted of four stages, according to the e-mail survey methods outlined by Dillman (2000). First, 10 days before the survey was executed, a letter describing the study was sent by e-mail to all potential respondents. This first contact allowed the researchers to identify incorrect or nonfunctioning e-mail addresses (About 55 returns). New e-mail addresses were found for these people, and replacement letters were sent or adjustments were made to the survey population. The second stage involved sending another letter to all potential respondents, with the survey's web address (http://nofc.cfs.nrcan.gc.ca/parc/). (For more information regarding the survey web page construction, see Appendix 2). Third, 10 days after the main mailing, a thank-you and reminder e-mail was sent to all potential respondents. Finally, after another 10 days had elapsed, a reminder was sent to those who had not yet completed the survey. Pretesting suggested that the average completion time was 20 to 25 mins.

The complete survey and all scores can be found in Appendix 3. Respondents were first asked to identify their geographic area (Alberta, Saskatchewan, Manitoba, or outside the Prairies), the focus of their work (local, provincial, national, or international), and the sector with which they were most involved. The survey consisted of eight main sections as follows.

1. Perceptions of policy problems: The questions in this section were posed as key policy problems from each sector, which the investigators had found in the literature and through personal interviews. An example of a policy problem was uncompetitive agriculture industry. Respondents were asked to subjectively assess the seriousness of each problem.
2. Important sector-specific issues: Respondents were asked questions relating to key issues in their particular sector (agriculture, forestry, or water resources). The purpose of this sector was to measure policy core belief for the ACF.
3. Attitudes toward the science of climate change: In this section, respondents were asked to evaluate simple climate-related data, including historical precipitation and temperature trends, as well as projected climate scenarios across the Prairies.
4. Responsibility for climate change: Respondents were asked what type of organization was responsible for impact and adaptation policies related to climate change.
5. Perceptions of risk: This section used questions similar to, albeit modified, those used by Slovic (1987) and Lazo et al. (2000) to measure risk perception.
6. Network linkages: Three questions relating to the policy network structure were posed. The first ascertained the organizations that respondents relied on for shared values and policy viewpoints and as sources of valid information, and the degree of power they perceived these organizations as holding. The second question was used to identify organizations that respondents considered as allies, measured by the extent to which information was shared, whether the respondents' organization would develop a joint policy position or strategy with the organization type, and if they would modify their organization's behavior to achieve common goals. The third question asked respondents to identify the organizations they considered as their opposition.
7. General Political Beliefs: The questions in this section measured broad deep normative core policy beliefs. These questions could be generalized across all sectors, for example, the perceived need for government to protect property rights.
8. Demographic information: Key demographic data such as age, education, employment, gender, and family status were determined in this section.

The statistical analysis used for the survey results was one-way analysis of variance (ANOVA), which compares the means of more than two samples. In this case the null hypothesis (H_0) was
$\mu 1 = \mu 2 = \ldots = \mu_k$
where μ_i is the mean of group *i*. The *F* statistic was constructed for testing the hypothesis:

$$F = \frac{\text{variation among sample means}}{\text{variation within samples}}$$

If the means are far apart, especially relative to the variation within each group, the *F* statistic is large and the null hypothesis is rejected. Throughout this study, a test of homogeneity of variance (the Levine test), ANOVA, and a post hoc pairwise multiple-comparison test using the Tukey's *b* method were employed. The Levine test was used to test for equal variance. ANOVA (*F* statistic) can indicate differences among means but does not identify the means that differ from each other. The Tukey's *b* score identifies subsets of groups. The results of the homogeneity of variance tests are given in Appendix 4, along with the nonsignificant *F* statistics from the ANOVA (>0.05).

During the first stage of the project, a total of 851 individuals were identified (primarily from organizations) as belonging to the Prairie agriculture, forestry, and water resource policy communities. Of theses, 356 provided usable responses, for a return rate of 41.8%. The return rate was lower than in Sabatier and Zafonte's (1995) regional Delta/Bay study (55%) but higher than Laumann and Knoke's (1987) national-level network study (35%).

Background of Respondents

For ease of comparison and statistical reliability, the organizations were grouped in 11 major categories (Fig. 1 and Table 2). The largest group consisted of respondents from provincial environmental agencies (Manitoba Department of Conservation, Saskatchewan Environment and Resource Management, and Alberta Sustainable Development), which are responsible for forestry- and water-related issues. Provincial agriculture agencies and agriculture producer groups also represented large proportions of respondents. Consultants, researchers, and environmental organizations made up the other 19.1% of respondents (Table 2).

The proportions of organizational, sectoral and provincial respondents closely reflected the population of potential respondents initially identified (Fig. 2). The only exception was for the forest industry; although this group represented 11% of the identified study population, only 6.7% of the respondents were from this group.

This study focused on the Prairie policy community as a whole, rather than individual provinces, for three reasons. First, in nearly all cases there were no significant differences among individual provinces. Second, there was a sizeable federal presence in the study population (16.0% of respondents), consisting of individuals stationed in regional offices and the respective Ottawa headquarters. Third, for the Manitoba water resources sector, there were too few respondents to undertake a statistical analysis. This was not so much an issue of a low return rate but rather a very small potential study population.

Table 3 outlines the demographic characteristics of the respondents, along with, where possible, the corresponding population data. The agriculture and forestry sectors had the greatest proportions of respondents, and Alberta and Saskatchewan represented the largest geographic groups. Manitoba-based respondents and the corresponding population were only slightly greater in number than the non-Prairie respondents and population. This indicates the small size of Manitoba's agriculture, forestry, and water resource policy communities. Most of the respondents were well-educated men; just over half had obtained postgraduate training.

Table 2. Organizational groups used in the study of policy networks and policy belief structures

Organization type	No. (and %) of respondents	
Provincial environment agencies	84	(23.6)
Provincial agriculture agencies	48	(13.5)
Agricultural producer groups	43	(12.1)
Research institutions	34	(9.6)
Environment Canada	25	(7.0)
Forest industry	24	(6.7)
Agriculture and Agri-Food Canada or PFRA	21	(5.9)
Environmental groups	19	(5.3)
Consultants	15	(4.2)
Natural Resources Canada	11	(3.1)
Other	32	(9.0)
Total	356	(100.0)

Note: PFRA = Prairie Farm Rehabilitation Administration.

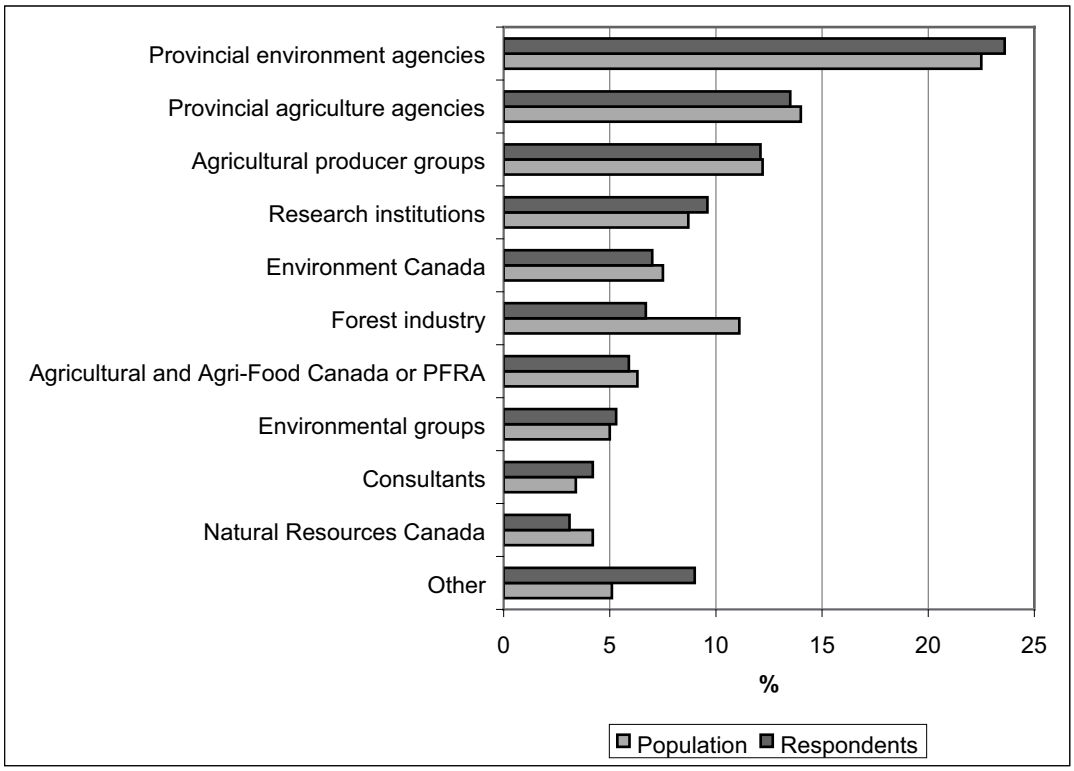

Figure 2. Organizational affiliation of respondents compared with distribution in the population of potential respondents. PFRA = Prairie Farm Rehabilitation Administration.

Table 3. Demographic characteristics of respondents

Demographic characteristics	% of respondents	% of population
Sector		
Agriculture	38	37
Forestry	35	35
Water resources	27	28
Province		
Alberta	37	36
Saskatchewan	33	33
Manitoba	17	18
Non-Prairie	13	13
Gender		
Male	82	NA
Female	18	NA
Education		
High school or less	2	NA
College	11	NA
Bachelor's degree	35	NA
Master's degree	36	NA
Doctorate	15	NA
Other	1	NA

Note: NA = not available.

Policy Network Analysis

This section presents the sociologically inspired network analysis, which explores respondents' ties to various organizations in terms of reliance on, allegiance to, and opposition to those organizations. The results indicate which organizations are perceived as key policy actors within the three policy communities.

Table 4 identifies organizations on which respondents relied heavily for a policy point of view and as a source of valid information, innovative ideas, and power. Not surprisingly, similar organizations relied on one another. For each of the 10 organization types, the highest score occurred in relation to organizations of the same type. For example, of the 219 responses from those representing provincial environmental agencies, 58 identified the same type of organization (Table 4).

An alternative measure of network strength is the ratio between the number of responses identifying a particular type of organization and the number of responses from that organization type (Table 5). For example, there were 132 responses from individuals representing provincial agriculture agencies, whereas only 70 respondents indicated that they relied heavily on this type of organization (Table 4); the ratio is therefore 0.53. A ratio of 1 or more indicates organizations that were relied on more heavily, whereas a score of less than 1 indicates those relied on less heavily. Federal agencies (particularly Agriculture and Agri-Food Canada, Natural Resources Canada, and the Prairie Farm Rehabilitation Administration [PFRA]) environmental groups, and research institutions had high scores according to this measure. Provincial government agencies, agricultural producer groups, and the forest industry had ratio scores less than one.

There was less intraorganizational identification of allies (Table 6). Only respondents from agricultural producers and the forest industry had a strong tendency to look upon their own organization type as allies. Research institutions were most frequently identified as the organization type where respondents felt they would find an ally. Respondents also identified environmental groups and federal departments as strong allies.

Surprisingly, only a minority of respondents (134 or 37.6%) replied to the question about which organizations they regarded as opposition. In fact, several respondents indicated that they could not identify any opposition, and some made further remarks about this question in the comments section of the survey, stating that cooperation, not conflict, was necessary for policy-making. Nonetheless environmental groups were regarded as the main source of opposition (149 or 37.2% of the 401 opposition responses [Table 7]), especially by provincial environment agencies and the forest industry. In fact, the opposition ratio of 6.77 for environmental groups (Table 5) indicates that perceived opposition from environmental groups was strong throughout the entire population. Agricultural producer groups were the second most frequent source of opposition, particularly by provincial and federal government agencies and other agricultural producer groups.

Table 4. Organizations on which respondents relied heavily for policy viewpoints and as a source of valid information, innovative ideas, and power

	Respondent's organization											
Identified organization	Provincial environment agencies	Provincial agriculture agencies	Agricultural producer groups	Research institutions	Environment Canada	Forest industry	Agriculture and Agri-Food Canada or PFRA	Environmental Groups	Consultants	Natural Resources Canada	Other	Total
Provincial environment agencies	58	3	1	10	7	12	0	6	5	2	13	117
Provincial agriculture agencies	3	33	24	5	0	0	5	0	0	0	0	70
Agricultural producer groups	3	15	30	4	1	1	7	2	1	0	5	69
Research institutions	41	24	15	27	7	9	6	5	5	5	12	149
Environment Canada	36	0	0	6	10	10	1	5	2	6	2	88
Forest industry	8	0	0	0	0	13	0	0	4	2	3	29
Agriculture and Agri-Food Canada or PFRA	1	51	36	14	3	0	27	1	2	0	5	138
Environmental groups	15	1	2	6	7	1	0	11	12	2	4	62
Consultants	0	0	0	0	0	0	0	0	0	0	0	0
Natural Resources Canada	40	1	0	7	15	13	1	5	7	11	1	104
Other	14	3	4	4	5	3	4	4	1	0	4	52
Total	219	132	112	83	55	61	51	39	39	28	25	823

Note: PFRA = Prairie Farm Rehabilitation Administration.

Table 5. Strength of organizational relationships[a]

Organization type	Rely	Ally	Oppose
Provincial environment agencies	0.53	0.42	0.20
Provincial agriculture agencies	0.53	0.56	0.09
Agricultural producer groups	0.62	0.92	1.55
Research institutions	1.80	1.93	0.70
Environment Canada	1.60	1.42	0.47
Forest industry	0.48	0.95	0.60
Agriculture and Agri-Food Canada or PFRA	1.22	1.63	0.67
Environmental groups	1.59	2.35	6.77
Consultants	0	0	0
Natural Resources Canada	3.71	2.31	0.36
Other	2.08	.89	2.96

[a]As ratio of number of responses identifying a particular type of organization to number of responses from that organization type.
Note: PFRA = Prairie Farm Rehabilitation Administration.

Table 6. Organizations regarded as allies (sharing information, developing joint policy positions, voluntarily modifying organization's behavior)

	Respondent's organization											
Identified organization	Provincial environment agencies	Provincial agriculture agencies	Agricultural producer groups	Research institutions	Environment Canada	Forest industry	Agriculture and Agri-Food Canada or PFRA	Environmental groups	Consultants	Natural Resources Canada	Other	Total
Provincial environment agencies	32	2	0	7	7	8	0	5	4	3	13	81
Provincial agriculture agencies	1	19	18	6	2	0	12	1	1	0	1	61
Agricultural producer groups	7	16	45	7	1	1	12	3	0	0	3	88
Research institutions	35	24	12	19	10	15	5	5	7	6	5	143
Environment Canada	23	6	6	9	3	3	6	3	0	7	8	74
Forest industry	18	1	0	1	0	21	1	0	9	2	4	57
Agriculture and Agri-Food Canada/ or FRA	1	38	14	10	1	0	10	0	0	0	2	76
Environmental groups	24	1	0	4	14	3	0	13	8	4	7	78
Consultants	0	0	0	0	0	0	0	0	0	0	0	0
Natural Resources Canada	30	0	0	7	10	6	0	3	2	4	0	62
Other	20	1	1	4	4	3	2	2	1	0	2	40
Total	191	108	96	74	52	60	48	35	32	26	45	767

Note: PFRA = Prairie Farm Rehabilitation Administration.

Table 7. Organizations regarded as opposition

	Respondent's organization											
Identified organization	Provincial environment agencies	Provincial agriculture agencies	Agricultural producer groups	Research institutions	Environment Canada	Forest industry	Agriculture and Agri-Food Canada or PFRA	Environmental groups	Consultants	Natural Resources Canada	Other	Total
Provincial environment agencies	0	0	0	1	4	1	1	3	3	0	4	17
Provincial agriculture agencies	0	2	1	1	0	0	1	0	0	0	0	5
Agricultural producer groups	6	21	25	7	0	0	10	4	2	0	1	76
Research institutions	6	4	4	3	3	0	1	1	2	1	1	26
Environment Canada	0	2	1	2	0	0	1	1	0	1	6	14
Forest industry	6	0	0	4	0	8	0	7	1	0	1	27
Agriculture and Agri-Food Canada or PFRA	0	5	6	2	0	0	1	0	0	0	0	14
Environmental groups	51	7	5	9	7	34	2	1	15	11	7	149
Consultants	0	0	0	0	0	0	0	0	0	0	0	0
Natural Resources Canada	0	0	0	1	3	0	0	0	0	0	1	5
Other	15	10	7	7	13	2	4	5	2	1	2	68
Total	84	51	49	37	30	45	21	22	25	14	23	401

Note: PFRA = Prairie Farm Rehabilitation Administration.

Advocacy Coalition Framework

In addition to determining the relationships among the various organizational actors, this study examined respondents' policy-oriented beliefs. The first part of this section examines the deep normative core beliefs of respondents from the forest sector, which were expected to influence the more specific policy core beliefs (Part 2 of the survey, Appendix 2). The second part of this section delves into those specific policy core beliefs.

Deep Normative Core Beliefs within the Forest Sector

An ANOVA was conducted for each of the deep normative core beliefs (Table 8). The *F* value for 5 of the 12 items was significant at the 0.05 level, which indicates differences among organization types (Tables 9-13). Four of these beliefs centered on environment-related issues, namely that ecological factors should guide use of natural resources, that human interference with nature leads to disaster, that humans must live in harmony with nature, and that more technology can solve environmental problems. Two of the five beliefs contained homogenous subsets, meaning that identifiable clusters of organizations could be identified. In general, environmental groups and research institutions had the highest mean scores on environmental issues, which indicates that the world views of these respondents were in line with the new environmental paradigm (Olsen et al. 1992). Respondents from the forest industry had the highest scores for the technology statement, which indicates a greater reliance on technology to solve environmental problems. The protection of property rights was the only economic-based value with a statistically significant difference among organization types. As for the environmental items, the forest industry had the highest mean score for this belief, which indicates a higher level of support for property rights as an important political consideration.

A principal-components factor analysis method with a varimax rotation was employed to further examine the deep normative core beliefs of members of the forest policy community (Table 14). Ten of the 12 belief statements were loaded onto two separate components, which also reflected the two belief paradigms identified in the social science literature: the new environmental paradigm (questions relating to environmental issues) and the human exemptionalism, or pro-growth, paradigm (questions relating to the promotion of economic issues) (see Olsen et al. 1992). A factor analysis of all 10 significant items revealed a structure that explained 73% of the scale variance. Strong factor loadings were observed, confirming the presence of consistent beliefs among individual respondents who adopted the new environmental paradigm. A comparison of means using ANOVA and Tukey's *b* tests for heterogeneity found that only the ecological scores were statistically significant (Tables 15, 16).

Table 8. Summary of analysis of variance for deep normative core beliefs

Normative beliefs	Sum of squares	df	Mean square	*F*	*p*
Protection of property rights					
Between groups	22.646	6	3.774	2.866	0.013
Within groups	133.012	101	1.317		
Total	155.657	107			
Balance of nature is delicate					
Between groups	8.634	6	1.439	1.058	0.393
Within groups	141.474	104	1.360		
Total	150.108	110			
Best government is the one that governs least					
Between groups	7.121	6	1.187	0.888	0.507
Within groups	132.284	99	1.336		
Total	139.406	105			
Ecological factors should guide natural resource use					
Between groups	15.229	6	2.538	2.181	0.050
Within groups	122.199	105	1.164		
Total	137.429	111			
Economic market is important					
Between groups	10.561	6	1.760	1.384	0.228
Within groups	133.502	105	1.271		
Total	144.062	111			
Too much importance attached to economic measures					
Between groups	12.946	6	2.158	1.425	0.212
Within groups	158.974	105	1.514		
Total	171.920	111			
Must limit the number of people on earth					
Between groups	18.286	6	3.048	2.036	0.068
Within groups	148.176	99	1.497		
Total	166.462	105			
Human interference with nature leads to disaster					
Between groups	24.680	6	4.113	3.199	0.006
Within groups	133.717	104	1.286		
Total	158.396	110			
Humans must live in harmony with nature					
Between groups	14.555	6	2.426	2.495	0.027
Within groups	101.138	104	0.972		
Total	115.694	110			
More technology can solve environmental problems					
Between groups	16.497	6	2.750	2.927	0.011
Within groups	99.573	106	0.939		
Total	116.071	112			
Plants and animals exist primarily to be used by humans					
Between groups	14.875	6	2.479	1.808	0.105
Within groups	139.896	102	1.372		
Total	154.771	108			
There is a limit to growth					
Between groups	11.286	6	1.881	1.544	0.171
Within groups	125.487	103	1.218		
Total	136.773	109			

Note: df = degrees of freedom.

Table 9. Mean scores for protection of property rights

Organization type	*n*	Mean score
Environmental groups	9	2.33
Research institutions	8	2.38
Other	9	2.44
Consultants	7	3.29
Provincial environment agencies	45	3.36
Natural Resources Canada	9	3.44
Forest industry	21	3.62

Presented in order of increasing mean score.

Table 10. Mean scores for ecological factors should guide use

Organization type	*n*	Subset for alpha = .05	
		1	2
Forest industry	23	3.09	
Consultants	7	3.29	3.29
Provincial environment agencies	45	3.33	3.33
Other	9	3.44	3.44
Natural Resources Canada	10	3.50	3.50
Research institutions	9	3.67	3.67
Environmental groups	9		4.56

Presented in order of increasing mean score.

Table 11. Mean scores for human interference with nature leads to disaster

Organization type	*n*	Subset for alpha = .05	
		1	2
Forest industry	23	2.39	
Consultants	7	3.00	3.00
Other	9	3.22	3.22
Provincial environment agencies	44	3.27	3.27
Natural Resources Canada	10	3.40	3.40
Research institutions	9	3.78	3.78
Environmental groups	9		4.00

Presented in order of increasing mean score.

Table 12. Mean scores for humans must live in harmony with nature

Organization	*n*	Subset for alpha = .05
Natural Resources Canada	10	3.60
Consultants	7	3.71
Forest industry	23	3.74
Research institutions	9	4.33
Provincial environment agencies	45	4.33
Other	9	4.33
Environmental groups	8	4.88

Presented in order of increasing mean score.

Table 13. Mean scores for more technology can solve environmental problems

Organization	*n*	Subset for alpha = .05
Other	9	1.78
Environmental groups	9	1.89
Natural Resources Canada	10	2.00
Research institutions	9	2.56
Consultants	7	2.71
Provincial environment agencies	46	2.74
Forest industry	23	2.87

Presented in order of increasing mean score.

Table 14. Structure of deep normative core beliefs

	Component	
	Alpha	Alpha
Deep normative core beliefs	0.784	-0.621
Protection of property rights		0.725
Balance of nature is delicate	0.600	
Best government is the one the governs the least		0.691
Ecological factors should guide natural resource use	0.638	
Too much importance attached to economic measures	0.607	
Must limit the number of people on earth	0.619	
Humans must live in harmony with nature	0.609	
More technology can solve environmental problems		0.636
Plants and animals exist primarily to be used by humans		0.606
There is a limit to growth	0.688	

Table 15. Summary of analysis of variance for deep normative core beliefs

Factored deep normative core beliefs	Sum of squares	df	Mean square	*F*	*p*
Ecological-related beliefs					
Between groups	10.431	6	1.739	3.263	0.006
Within groups	49.012	92	0.533		
Total	59.443	98			
Economic-related beliefs					
Between groups	5.759	6	0.960	1.999	0.074
Within groups	44.648	93	0.480		
Total	50.408	99			

Note: df = degrees of freedom.

Table 16. Mean scores for ecological-related deep normative core beliefs[a]

Organization type	*n*	Mean score	
		1	2
Forest industry	22	3.0909	
Natural Resources Canada	10	3.4500	3.4500
Provincial environment agencies	37	3.4865	3.4865
Other	7	3.5476	3.5476
Consultants	7	3.5714	3.5714
Research institutions	9	3.8704	3.8704
Environmental groups	7		4.3810

[a]For beliefs where $p < 0.05$ by analysis of variance (see Table 15). Presented in order of increasing mean score.

Forest-Related Policy Core Beliefs

Given the noticeable difference in deep normative core beliefs among the forest policy actors, it is not surprising that there were different sector-specific policy core beliefs. On the basis of ANOVA of the policy core beliefs for forestry, 12 of 19 items had differences in mean scores among organization types (Table 17). In most cases, environmental groups had scores distinct from those of the forest industry and provincial environmental agencies (Tables 18-29). The Tukey's *b* post hoc multiple comparison yielded statistically different groupings for current provincial legislation promoting sustainable forest management (Table 18), environmental groups and the media exaggerating the environmental damage caused by forest management practices (Table 22), forests being managed for a wide range of uses (Table 25), and forest regeneration practices being adequate (Table 27). There was one notable forest-related policy core belief for which there were organizational differences that excluded both the forest industry and environmental groups: respondents from provincial environmental agencies were more likely to favor the belief that the best strategy for resolving issues involves regulation (Table 27).

A factor analysis of all 14 significant items revealed a structure that explained 66% of the scale variance (Table 30). Strong factor loadings were observed, confirming the presence of consistent policy core beliefs among individual respondents who adopted management and protection related beliefs. The first factor centered on forest management issues, whereas the second factor considered protection (from fire and insects). The ANOVA summary comparing organization types (Table 31) found that only the management-related beliefs were statistically significant. Tukey's *b* post hoc multiple comparisons supported the differences in mean score between the forest industry and environmental groups for individual items (Table 32). It also confirmed the consistency of the belief structure of the policy elite.

Table 17. Summary of analysis of variance for specific forest-related policy core beliefs

Forest-related policy core beliefs	Sum of squares	df	Mean square	*F*	*p*
Legislation promotes sustainable forest management					
Between groups	34.357	6	5.726	3.871	0.002
Within groups	140.516	95	1.479		
Total	174.873	101			
Forest biodiversity is threatened					
Between groups	25.489	6	4.248	2.862	0.013
Within groups	141.031	95	1.485		
Total	166.520	101			
Forest practices that mimic natural disturbances are best					
Between groups	20.754	6	3.459	2.582	0.023
Within groups	123.246	92	1.340		
Total	144.000	98			
Expansion of the forest industry is good for economy					
Between groups	31.003	6	5.167	3.261	0.006
Within groups	148.937	94	1.584		
Total	179.941	100			
Fire suppression is adequate					
Between groups	7.920	6	1.320	0.832	0.549
Within groups	146.040	92	1.587		
Total	153.960	98			
Insect suppression is inadequate					
Between groups	.602	6	.100	0.081	0.998
Within groups	108.334	87	1.245		
Total	108.936	93			
Environmental groups and media exaggerate environmental damage					
Between groups	35.295	6	5.882	3.438	0.004
Within groups	164.259	96	1.711		
Total	199.553	102			

Table 17. Continued

Forest-related policy core beliefs	Sum of squares	df	Mean square	*F*	*p*
Forest companies should have more property rights					
Between groups	12.229	6	2.038	1.521	0.180
Within groups	125.969	94	1.340		
Total	138.198	100			
Fish and wildlife stocks are good					
Between groups	22.720	6	3.787	2.765	0.016
Within groups	123.238	90	1.369		
Total	145.959	96			
Aboriginal concerns are represented					
Between groups	19.830	6	3.305	2.207	0.049
Within groups	140.744	94	1.497		
Total	160.574	100			
Forests are managed for a wide range of uses					
Between groups	29.064	6	4.844	3.572	0.003
Within groups	127.491	94	1.356		
Total	156.554	100			
Enough protected areas exist					
Between groups	36.549	6	6.092	2.913	0.012
Within groups	192.360	92	2.091		
Total	228.909	98			
Intensive forest management is realistic					
Between groups	9.329	6	1.555	0.840	0.543
Within groups	161.107	87	1.852		
Total	170.436	93			
Forest regeneration is adequate					
Between groups	33.459	6	5.576	3.886	0.002
Within groups	130.593	91	1.435		
Total	164.051	97			
Growing stock is sufficient					
Between groups	25.786	6	4.298	2.861	0.014
Within groups	130.692	87	1.502		
Total	156.479	93			
Resolve issues by consensus					
Between groups	6.944	6	1.157	0.855	0.531
Within groups	135.318	100	1.353		
Total	142.262	106			
Resolve issues by regulation					
Between groups	16.381	6	2.730	2.894	0.012
Within groups	96.224	102	.943		
Total	112.606	108			
Resolve issues by experts and professionals					
Between groups	5.975	6	.996	1.058	0.393
Within groups	96.944	103	.941		
Total	102.918	109			
Resolve issues by market-based instruments					
Between groups	7.796	6	1.299	1.002	0.428
Within groups	127.061	98	1.297		
Total	134.857	104			

Table 18. Mean scores for current provincial legislation and policies promote sustainable forest management

Organization type	*n*	Subset for alpha = .05	
			Mean score
Environmental groups	8	2.13	
Consultants	5	2.80	2.80
Research institutions	8	2.88	2.88
Natural Resources Canada	8	3.00	3.00
Other	8	3.13	3.13
Forest industry	22	3.36	3.36
Provincial environment agencies	43		4.00

Presented in order of increasing mean score.

Table 19. Mean scores for biodiversity is threatened by forest practices

Organization	*n*	Subset for alpha = .05
		Mean score
Forest industry	22	2.36
Provincial environment agencies	41	2.93
Natural Resources Canada	10	3.30
Consultants	5	3.40
Environmental groups	7	3.71
Other	9	3.78
Research institutions	8	3.88

Presented in order of increasing mean score.

Table 20. Mean scores for forest practices that mimic natural disturbances are the best form of forest management

Organization	*n*	Subset for alpha = .05
		Mean score
Research institutions	6	2.67
Environmental groups	7	2.71
Consultants	4	3.50
Natural Resources Canada	10	3.50
Other	9	3.56
Forest industry	21	3.57
Provincial environment agencies	42	4.10

Presented in order of increasing mean score.

Table 21. Mean scores for expansion of the forest industry will improve my province's economy

Organization	*n*	Subset for alpha = .05
		Mean score
Environmental groups	8	2.63
Other	8	2.63
Natural Resources Canada	9	2.67
Research institutions	8	2.75
Consultants	4	2.75
Forest industry	22	3.59
Provincial environment agencies	42	3.90

Presented in order of increasing mean score.

Table 22. Mean scores for environmental groups and media exaggerate environmental damage caused by forest management practices

Organization	*n*	Subset for alpha = .05	
		1	2
Environmental groups	8	2.25	
Other	8	2.75	2.75
Research institutions	9	3.00	3.00
Consultants	4	3.25	3.25
Natural Resources Canada	10	3.60	3.60
Provincial environment agencies	43	3.67	3.67
Forest industry	21		4.33

Presented in order of increasing mean score.

Table 23. Mean scores for fish and wildlife stocks are in good health

Organization	*n*	Subset for alpha = .05
Other	8	2.13
Research institutions	8	2.25
Consultants	4	2.50
Environmental groups	8	2.50
Provincial environment agencies	39	3.05
Natural Resources Canada	8	3.13
Forest industry	22	3.64

Presented in order of increasing mean score.

Table 24. Mean scores for aboriginal concerns are adequately represented in forest related decisions

Organization	*n*	Subset for alpha = .05
Research institutions	8	2.38
Other	7	2.43
Natural Resources Canada	10	2.80
Provincial environment agencies	43	3.02
Environmental groups	7	3.43
Consultants	4	3.50
Forest industry	22	3.77

Presented in order of increasing mean score.

Table 25. Mean scores for forests are managed for a wide range of uses, not just timber

Organization	*n*	Subset for alpha = .05	
		1	2
Environmental groups	6	1.83	
Other	8	2.63	2.63
Natural Resources Canada	10	2.70	2.70
Provincial environment agencies	43		3.49
Consultants	5		3.60
Research institutions	8		3.75
Forest industry	21		3.81

Presented in order of increasing mean score.

Table 26. Mean scores for enough protected areas exist

Organization	*n*	Subset for alpha = .05
Environmental groups	7	1.71
Consultants	3	2.00
Research institutions	8	2.13
Other	8	2.38
Natural Resources Canada	9	2.56
Provincial environment agencies	44	3.30
Forest industry	20	3.60

Presented in order of increasing mean score.

Table 27. Mean scores for forest regeneration practices are adequate

Organization	*n*	Subset for alpha = .05	
		1	2
Other	7	1.57	
Environmental groups	8	2.00	
Consultants	5	2.60	2.60
Natural Resources Canada	10	2.60	2.60
Research institutions	7	2.71	2.71
Provincial environment agencies	39	2.85	2.85
Forest industry	22		3.68

Presented in order of increasing mean score.

Table 28. Mean scores for there will be sufficient growing stock to meet economic needs

Organization	*n*	Subset for alpha = .05
Other	6	1.83
Environmental groups	7	2.14
Consultants	4	2.50
Natural Resources Canada	9	2.56
Research institutions	7	2.57
Provincial environment agencies	39	3.03
Forest industry	22	3.64

Presented in order of increasing mean score.

Table 29. Mean scores for the best strategy for resolving issues involves regulation

Organization	*n*	Subset for alpha = .05	
		1	2
Consultants	5	1.60	
Environmental groups	9	2.22	2.22
Research institutions	8	2.25	2.25
Natural Resources Canada	9	2.56	2.56
Forest industry	24	2.58	2.58
Other	8		3.00
Provincial environment agencies	46		3.04

Presented in order of increasing mean score.

Table 30. Structure of forest-related policy core beliefs

Core policy value	Management beliefs Alpha 0.74	Protection beliefs Alpha 0.85
Enough protected areas exist	0.794	
Forest regeneration is adequate	0.809	
There is enough growing stock	0.788	
Biodiversity is threatened	-0.779	
Fire suppression is adequate		-0.750
Insect suppression is adequate		0.726

Table 31. Summary of analysis of variance for forest-related policy core beliefs

Factored policy core beliefs	Sum of squares	df	Mean square	*F*	*p*
Management beliefs					
Between groups	7.033	6	1.172	2.918	0.013
Within groups	29.730	74	0.402		
Total	36.764	80			
Protection beliefs					
Between groups	2.049	6	0.342	.507	0.801
Within groups	57.255	85	0.674		
Total	59.304	91			

Note: df = degrees of freedom.

Table 32. Forest-related policy core management beliefs

Organization type	*n*	Mean score[a]	
		1	2
Forest industry	22	3.0909	
Natural Resources Canada	10	3.4500	3.4500
Provincial environment agencies	37	3.4865	3.4865
Other	7	3.5476	3.5476
Consultants	7	3.5714	3.5714
Research institutions	9	3.8704	3.8704
Environmental groups	7		4.3810

[a]For beliefs where $p<0.05$ by analysis of variance (see Table 31). Presented in order of increasing score.

DISCUSSION AND CONCLUSIONS

In this study, policy-making was understood as an empirically measurable dynamic process conducted by many governmental and societal actors within a specific sector and across sectors. Two popular policy-oriented theoretical frameworks were considered: the policy community – network policy approach and the ACF approach. There has already been considerable development of these and other models and frameworks within the context of Canadian forestry policy (Lindquist and Wellstead 2001). However, empirical applications have been limited. Here, these two approaches were examined with data from a web-based survey of Prairie agriculture, forestry, and water resource policy actors.

Clear delineations were evident in terms of policy network structures, as illustrated by the high degree of trust in federal and research-based organizations. There was also a high degree of reliance on like-minded organizations. Provincial agriculture and environmental agencies were seen neither as allies nor as opposition. Environmental organizations were viewed as the main source of opposition.

The first hypothesis presented in the Introduction argues that in any natural resource sector with an asymmetric division of federal responsibilities, actors within the policy community would identify federal government departments as brokering organizations. Across the policy communities in the three Prairie provinces this was the case particularly in the agriculture sector (Table 4). However, there was not a strong indication of trust or allegiance to any particular federal agency or department within the Prairie forest policy community. Other than with similar organizations, the forest sector showed little network interaction. The most interesting finding for this sector was the strong opposition to environment organizations, most of whom themselves belonged in the forest sector.

The second hypothesis stated that if policy communities related to industries based on natural resources (such as forestry) are dominated by public resource ownership and a single governmental regulatory agency, and there is a low degree of environmental conflict, a single homogenous system of policy core beliefs would dominate the policy community. With some notable exceptions, this analysis leads to the conclusion that there are two distinct advocacy coalitions within the Prairie forest policy community: a dominant coalition consisting of the forest industry and governmental agencies and a smaller coalition consisting of environmental groups. The role of respondents from research institutions was unclear. However, the analysis suggests that many of their beliefs are more in tune with the environmental advocacy coalition. The proportion of environmental policy actors identified within the entire Prairie forestry policy community was small (just over 5%). Moreover, Urquhart's (2001) analysis of the Prairie policy community found that environmental groups lacked the organizational capacity to effectively challenge the policy-making process.

The ACF literature argues that policy change occurs as a result of both exogenous and endogenous factors. The strong opposition to and belief isolation of environmental groups indicates that policy learning across advocacy coalitions may not occur readily. Policy learning within the Canadian Prairie forest sector will ultimately occur within the dominant policy advocacy coalition. Furthermore, the main source of significant change, which will challenge the assumptions of policy core beliefs, is likely to emerge from exogenous forces, such as changes in socioeconomic conditions, changes in systematic governing coalitions, or the actions of other policy communities (Fig. 1).

This study has provided critical information regarding three policy sectors in Canada's Prairie provinces. However, a one-time quantitative survey such as this one provides just a snapshot of the characteristics of these dynamic social systems, and further longitudinal research will be required. The following suggestions could guide additional work in this area.

First, additional sectors need to be included in the analysis. Some noteworthy candidate sectors would be energy and mining, transportation, and health care. Within any sector, extending the survey beyond the Prairie provinces, perhaps to include other countries, would also prove worthwhile, by enhancing comparative research to measure political responses at the provincial and national levels. Finally, such surveys ought to be administered regularly, to trace patterns of change in each of the variables.

Second, survey research is an important but not the only research tool for understanding policy processes. It allows the quantitative assessment of a large number of variables for a large number of respondents, but it must be considered in combination with more in-depth case studies of political units, which would include interviews with key informants, historical analysis of policy and media discourse, social network analysis, and demographic and economic assessments.

Third, this study has presented a snapshot of important elements of Prairie agricultural, forestry, and water resource policy-making, but additional steps must examine a key driver of policy change, that is, the potential for policy-oriented learning. According to Sabatier and Jenkins-Smith (1999), policy-oriented learning is the "relatively enduring alterations of thought or behavioral intentions that result from experience and/or new information and that are concerned with the attainment or revision of policy objectives." This will require a more detailed examination of secondary policy aspects (i.e., specific policies and programs) relating to forest management. Such analysis will allow determination of the extent to which secondary aspects can be changed through a learning process.

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LITERATURE CITED

Atkinson, M.; Coleman, D. 1992. Policy networks, policy communities and problems of governance. Governance 5(2) 154–180.

Brown, A.; Stewart, J. 1993. Competing advocacy coalitions, policy evolution, and airline deregulation. Pages 83–101 in P. Sabatier and H. Jenkins-Smith, eds. Policy Change and Learning. Westview Pr., Boulder, CO.

Burnett, M.; Davis, C. 2002. Getting out the cut: politics and national forest timber harvests, 1960–1995. Adm. SOC. 34:202-228.

Coleman, W.; Skogstad, G. 1990. Policy communities and public policy in Canada. Copp Clarke Pitman, Toronto, ON.

Coleman, W.; Skogstad, G.; Atkinson, M. 1997. Paradigm shifts and policy networks: cumulative change in agriculture. J. Public Policy 16:273–301.

Dillman, D. 2000. Mail and internet surveys. 2nd ed. Wiley, New York, N.Y.

Dowding, K. 1995. Model or metaphor? A critical review of the policy network approach. Polit. Stud. 43:136–158.

Dunlap, R.; Van Leire, K. 1978. The new environmental paradigm: a proposed measuring instrument and preliminary results. J. Environ. Educ. 9:10–19.

Grant, W. 1990. Forestry and forest products. Pages 118–140 in W. Coleman and G. Skogstad, eds. Policy communities and public policy in Canada. Copp Clark Pitman, Toronto, ON.

Howlett, M.; Rayner, J. 1995. Do ideas matter? Policy network configurations and resistance to policy change in the Canadian forest sector. Can. Public Admin. 38:382–410.

Howlett, M.; Ramesh, M. 2003. Studying public policy: policy cycles and policy subsystems. 2nd ed. Oxford Univ. Press, Don Mills, ON.

Jenkins-Smith, H. 1988. Analytical debates and policy learning: analysis and change in the federal bureaucracy. Policy Sci. 21:169–211.

Kenis, P.; Schneider, V. 1991. Policy networks and policy analysis: scrutinizing a new analytical tool box. Pages 25-59 in B. Martin and R. Mayntz, eds. Policy Networks: Empirical Evidence and Theoretical Considerations. Westview Pr., Boulder, CO.

Knoke, D., Pappi, F.; Broadbent, J.; Tsujinaka, Y. 1996. Comparing policy networks. Labour politics in the U.S., Germany, and Japan. Cambridge Univ. Pr., New York, NY.

Knoke, D. 1990. Political networks: the structural perspective. Cambridge Univ. Pr., New York, NY.

Laumann, E.; Heinz, J.; Nelson, R.; Salisbury, R. 1991. Organizations in political action: representing interests in national policy making. Pages 145–167 in B. Marin and R. Mayntz, eds. Policy networks: empirical evidence and theoretical considerations. Westview Pr., Boulder, CO.

Laumann, E.; Knoke, D. 1987. The organizational state: a perspective on national energy and health domains. Univ. Wisconsin Pr., Madison, WI.

Lazo, J.; Kinnell, J.; Fisher, A. 2000. Expert and layperson perceptions of ecosystem risk. Risk Anal. 20:179–193.

Lertzman, K.; Rayner, J; Wilson, J. 1996. Learning and change in British Columbia forest policy sector: a consideration of Sabatier's advocacy coalition framework. Can. J. Polit. Sci. 29:111–133.

Lindquist, E.,1992. Public managers and policy communities: learning to meet new challenges. Can. J. Public Admin. 35:127–157.

Lindquist, E.; Wellstead, A. 2001. Making sense of complexity: advances and gaps in comprehending the Canadian forest policy process. Pages 401–427 in M. Howlett, ed. Canadian forest policy: adapting to change. Univ. Toronto Pr., Toronto, ON.

Munroe, J. 1993. California water politics: explaining policy change in cognitively polarized subsystems. Pages 105-154 in P. Sabatier and H. Jenkins-Smith, eds. Policy Change and Learning. Westview Pr., Boulder, CO.

Olsen, M.; Lodwick, D.; Dunlap, R. 1992. Viewing the world ecologically. Westview Pr., Boulder, CO.

Pross, P. 1986. Group politics and public policy. Oxford Univ. Pr., Toronto, ON.

Sabatier, P. 1988. An advocacy coalition framework of policy change and the role of policy-oriented learning therein. Policy Sci. 21:129–168.

Sabatier, P.A.; Jenkins-Smith, H.C. 1993. Policy change and learning. Westview Pr., Boulder, CO.

Sabatier, P.; Jenkins-Smith, H. 1999. The advocacy coalition framework: an assessment. Pages 117–166 in P. Sabatier, ed. Theories of the policy process. Westview Pr., Boulder, CO.

Sabatier, P.; Zafonte, M. 1995. The views of Bay/Delta water policy activists on endangered species issues. West Northwest 2:131–146.

Sabatier, S.; Zafonte, M. 1999. Are bureaucrats and scientists members of advocacy coalitions? Pages 57–76 in P.A. Sabatier, ed. An advocacy coalition lens on environmental policy. MIT Pr., Cambridge, MA.

Schlager, E.; Blomquist, W. 1996. A comparison of three emerging theories of the policy process. Polit. Res. Q. 49:631–650.

Slovic, P. 1987. Perception of risk. Science 36:280–285.

Smith, A. 2000. Policy networks and advocacy coalitions: explaining policy change and stability in U.K. industrial pollution policy? Environ. Plann. C Gov. Policy 18:95–114.

Schneider, V.; Werle, R. 1991. Policy networks in the German telecommunications domain. Pages 97–136 in B. Martin and R. Mayntz, eds. Policy Networks: Empirical Evidence and Theoretical Considerations. Westview Pr., Boulder, CO.

Urquhart, I. 2001. New players, same game? Managing the boreal forest on Canada's prairies. Pages 316-347 in M. Howlett, ed. Canadian forest policy: adapting to change. Univ. Toronto Pr., Toronto, ON.

Van Waarden, F. 1992. Dimensions and types of policy networks. Eur. J. Polit. Res. 21:29–52.

Wellstead, A. 1996. The role of the advocacy coalition framework in understanding forest policy change: Alberta and Ontario. M.A. thesis, Univ. Toronto, Toronto, ON.

Weyent, J. 1988. Is there policy oriented learning in the analysis of natural gas issues? Policy Sci. 21:239–262.

Wilson, J. 1990. Wilderness politics in BC: the business dominated state and the containment of environmentalism. Pages 141–169 in W. Coleman and G. Skogstad, eds. Policy communities and public policy in Canada. Copp Clark Pitman, Toronto, ON.

APPENDIX 1
Organizations within the Prairie Agriculture, Forestry, and Water Resource Policy Communities

Agriculture

Agricore
Agriculture and Agri-Food Canada
Agriculture and Food Council of Alberta
Alberta Applied Research Association
Alberta Barley Commission
Alberta Canola Producers Commission
Alberta Cattle Commission
Alberta Cattle Feeders' Association
Alberta Conservation Tillage Association
Alberta Grain Commission
Alberta Institute of Agrologists
Alberta Irrigation Projects Association
Alberta Pulse Growers
Alberta Winter Wheat Producers Commission
Canada Grains Council
Canadian Canola Growers Association
Canadian Cattlemen's Association
Canadian Federation of Agriculture
Canadian Meat Council
Canadian Pork Council
Canadian Seed Growers' Association
Canadian Society for Soil Science
Canadian Special Crops Association
Canola Council of Canada
Con Agra Grain
Crop Protection Institute
Farm Credit Corporation
Keystone Agricultural Producers
Manitoba Agriculture
Manitoba Canola Growers Association
Manitoba Cattle Producers Association
Manitoba Chicken Producers
Manitoba Crop Insurance Corporation
Manitoba Forage Council
Manitoba Institute of Agrologists
Manitoba Seed Growers' Association
Prairie Farm Rehabilitation Administration
Saskatchewan Agriculture and Food
Saskatchewan Canola Growers Association
Saskatchewan Cattle Feeders Association
Saskatchewan Crop Insurance Corporation
Saskatchewan Institute of Agrologists
Saskatchewan Pulse Growers
Saskatchewan Soil Conservation Association
Saskatchewan Wheat Pool
Saskatchewan Winter Cereal Growers
United Grain Growers
University of Alberta
University of Calgary
University of Lethbridge
University of Manitoba
University of Regina
University of Saskatchewan
University of Winnipeg
Western Barley Growers
Western Canadian Wheat Growers
Wild Rose Agricultural Producers

Forestry

Alberta Environment
Alberta Environmental Network
Alberta Forest Products Association
Alberta Land and Forest Service
Alberta Newsprint Company
Alberta Pacific Ltd.
Alberta Registered Professional Foresters
Alberta Society of Professional Biologists
Alberta Wilderness Association
Assembly of First Nations
Assembly of Manitoba Chiefs
Canadian Aboriginal Science and Technology Society
Canadian Forestry Association
Canadian Institute of Forestry
Canadian Institute of Forestry
Canadian Lumbermen's Association
Canadian Nature Federation
Canadian Parks and Wilderness Association
Canadian Pulp and Paper Association
Canadian Sustainable Forestry Certification Association
Canfor Ltd.
Central Forest Products Association
Centre for Indigenous Environmental Resources
Clearwater Forest Products
Climate Change Central
Climate Change Secretariat (NRCan)
Council of Forest Industries
Council of Saskatchewan Forest Industries
Daishowa-Marubeni International Ltd.
David Suzuki Foundation
Environment Canada
Environment Probe
Environmental Protection Service
Federation of Alberta Naturalists
Federation of Saskatchewan Indian Nations
Foothills Model Forest
Forest Engineering Research Institute
Forest Stewardship Council
Friends of the Athabasca
Friends of the Earth
Greenpeace
International Institute for Sustainable Development
Manitoba Conservation
Manitoba Eco-Network
Manitoba Forestry Association
Manitoba Future Forest Alliance
Manitoba Keewatinowi Okimakanak
Manitoba Model Forest
Manning Diversified Forest Products
Meteorological Service of Canada
Métis Nation of Alberta
Métis National Council
Millar Western Forest Products Ltd.
Mistik Management
Native Plant Society of Saskatchewan
Natural Resources Canada (NRCan)
Nature Saskatchewan
NorSask Forest Products Partnership
NRCan, Canadian Forest Service
NRCan, Geological Survey of Canada
Pembina Institute
Prince Albert Model Forest
Pulp and Paper Research Institute of Canada
Saskatchewan Action Foundation for the Environment
Saskatchewan Council of Independent Forest Industries
Saskatchewan Eco-Network
Saskatchewan Environment and Resource Management
Saskatchewan Environmental Managers Association
Saskatchewan Environmental Society
Saskatchewan Forest Conservation Network
Saskatchewan Forestry Association
Sierra Club of Canada
Sundance Forest Industries
Suntec Forest Products
Sustainable Forest Management National Centre of Excellence
Tolko Industries Ltd.
Treaty 7 Tribal Council
University of Calgary
University of Lethbridge
University of Manitoba
University of Regina
University of Saskatchewan
University of Winnipeg
Weldwood of Canada Ltd.
Western Canada Wilderness Committee
Weyerhaeuser Company
World Wildlife Fund

Water Resources

Alberta Environment
Alberta Environmental Network
Alberta Fish and Game Association
Alberta Fish Farmers Association
Alberta Soil and Water Conservation Society
Alberta Water and Wastewater Operators
Assembly of First Nations
Assembly of Manitoba Chiefs
Association of Professional Engineers, Geologists and Geophysicists of Alberta
Canadian Aboriginal Science and Technology Society
Canadian Aquaculture Industry Alliance
Canadian Nature Federation
Canadian Water and Wastewater Association
Canadian Water Resources Association
Centre for Indigenous Environmental Resources
Climate Change Central
David Suzuki Foundation
Delta Waterfowl Foundation
Ducks Unlimited
Environment Canada
Environment Probe
Environmental Conservation Service
Environmental Protection Service
Federation of Saskatchewan Indian Nations
Friends of the Athabasca
Friends of the Earth
Geological Survey of Canada
Greenpeace
Manitoba Conservation
Manitoba Eco-Network
Manitoba Keewatinowi Okimakanak
Meewasin Valley Authority
Meteorological Service of Canada
Métis Nation of Alberta
Métis National Council
Natural Resources Canada
NRCan, Climate Change Secretariat
Pembina Institute
Prairie Association for Water Management
Saskatchewan Environment and Resource Management
Saskatchewan Environmental Society
Saskatchewan Ground Water Association
Saskatchewan Soil and Water Conservation Society
Saskatchewan Water and Wastewater Association
Saskatchewan Water Corporation
Saskatchewan Wetland Conservation Corporation
Sierra Club of Canada
Treaty 7 Tribal Council
Trout Unlimited
University of Alberta
University of Calgary
University of Lethbridge
University of Manitoba
University of Regina
University of Saskatchewan
University of Winnipeg
Waterwatch
Western Canada Water and Wastewater Association
Western Canada Water Environment Association
Western Canada Wilderness Committee
World Wildlife Fund

APPENDIX 2
Technical Method for Prairie Adaptation Research Collaborative Web-based Survey

This web-based survey used HTML-form markup on the client browser, interpreted by PERL CGI (common gateway interface) scripting on the server.

After a page was submitted, the data from that page were stored in variables and passed to successive pages (Fig. A2-1). When the survey was complete and had been submitted, all the data for each part were written to text files in a delimited format. This made importing the data into a spreadsheet or database application simple.

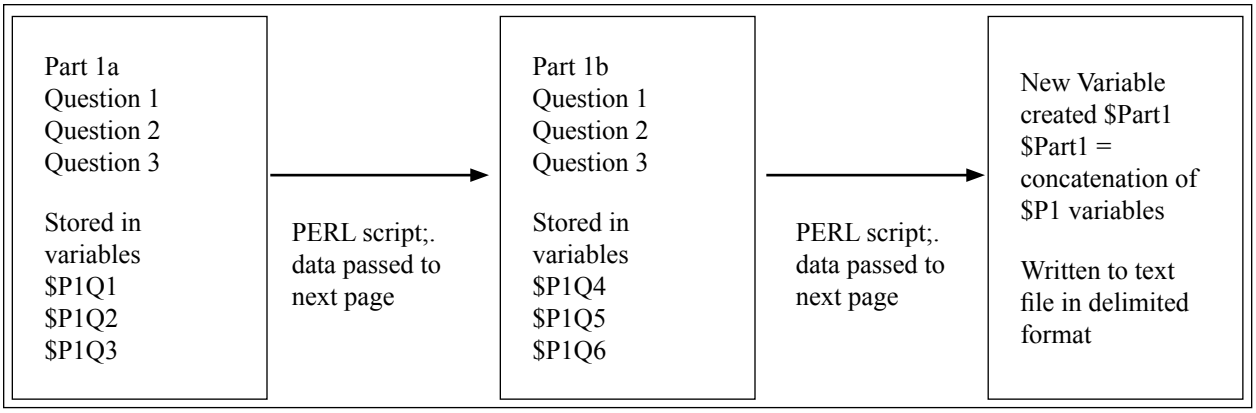


Figure A2-1. Method of storing data from web-based survey.

Data are stored in individual variables and passed to successive pages. Upon completion of a given part, a new variable is created, which is a concatenation of all individual variables for that part. This new variable is passed to successive pages until the survey is completed, when it is written to a text file in delimited format. PERL = practical extraction and report language.

APPENDIX 3
Results from the Resource Management Policy and Climate Change Survey

Your Province

Alberta	36.7%
Saskatchewan	35.1%
Manitoba	16.0%
Outside the Prairies	11.2%

Your Sector

Please indicate what sector your work is MOST actively involved with:

Agriculture	40.7%
Forestry	33.4%
Water resources	25.8%

Your Work Focus

Please indicate the focus of your work (check all that apply):

Local	31.2%
Provincial	73.3%
Federal	30.1%
International	16.9%

Note: numbers may be greater than 100% because respondents could check off more than one option.

Part One - Important Issues

Below is a list of issues related to provincial policy making within the agricultural, forestry, and water sectors. These issues have been identified in the literature as problems. Please indicate your assessment of the seriousness of each problem below. A score of 1 indicates not a problem for policymakers, while a score of 3 indicates somewhat of a problem, and a score of 5 indicates a very serious problem for policymakers. DK (9) indicates a response of don't know.

	Mean Scores
1. Uncompetitive agriculture industry	3.31
2. Declining quality of agricultural soils	3.40
3. Increased frequency of droughts on prairie agricultural lands	3.91
4. Soil erosion on prairie agricultural lands	3.44
5. Spread of foreign agricultural diseases	3.27
6. Loss of forest biodiversity	3.32
7. Protectionist trade policies	3.92
8. Greater demands by non-timber users (e.g., recreation, hunting, environmentalists)	3.18
9. Poor forest management practices	3.20
10. Greater frequency/severity of forest fires	3.33
11. Greater frequency/severity of insect damage in forested areas	3.31
12. Poor quality of prairie water supply for urban and/or agricultural users	3.82
13. Increased flooding	2.77
14. Water restrictions/shortages	3.64
15. Long-term climate change due to greenhouse gas emissions	3.65

Part Two. Important Agricultural Issues

The following items express perceptions about Prairie agricultural issues. A score of 1 indicates strong disagreement with the statement, a score of 3 indicates a neutral response, while a 5 indicates strong agreement with the statement. NOp (9) indicates no opinion. Please respond from the perspective of your province/region.

		Mean Scores
1.	The prairie agriculture industry can compete in global markets	3.88
2.	Greater diversification into specialty crops and into intensive livestock operations is needed improve the viability of the prairie agriculture industry	3.88
3.	The federal government should increase funding for farm subsidy programs	2.64
4.	The provincial government in my province should increase funding for farm subsidy programs	2.45
5.	An increase in irrigation systems is a feasible alternative to countering damage caused by droughts	2.57
6.	Provincial crop insurance programs adequately protect prairie farmers from damage caused by droughts, flooding, and insects	2.73
7.	The elimination of the CROW rate had a serious long-term negative effect on the competitiveness of the prairie agriculture industry	2.75
8.	Downstream water supplies are adequately protected from agricultural operations	2.69
9.	The decline of the family farm is a serious economic and social problem in my province	3.61
10.	The best strategies for resolving most issues in my sector involve:	
	a) Consensus-based negotiations among stakeholders	3.72
	b) Reliance on existing regulations	2.61
	c) Reliance on experts and professionals	3.25
	d) Reliance on market-based instruments (e.g., carbon credit trading)	2.92
11.	Communities and municipal governments should have more power in making decisions in my sector	2.88
12.	Drainage of wetlands due to agricultural and other purposes is a critical issue	3.35

Part Two. Important Forestry Issue

The following items express perceptions about prairie forestry issues. A score of 1 indicates strong disagreement with the statement, a score of 3 indicates a neutral response, while a 5 indicates strong agreement with the statement. NOp (9) indicates no opinion. Please respond from the perspective of your province/region.

		Mean Scores
1.	Current provincial forest legislation and policies promote sustainable forest management in my province	3.39
2.	Species biodiversity is being threatened by current forest management practices	3.05
3.	Forest practices that mimic natural disturbances are the best form of forest management strategy	3.67
4.	The expansion of the forest industry will improve my province's economy	3.39
5.	Forest fire suppression is adequate enough to prevent most major forest fires	3.05
6.	Insect infestation suppression is inadequate (especially in the case of a large outbreak)	3.12
7.	Environmental groups and the media tend to exaggerate the environmental damage caused by forest management practices	3.55
8.	Forest companies should be given a wider range of private property rights on Crown lands	1.92
9.	Fish and wildlife stocks in forested areas are in good health	3.03
10.	The best strategies for resolving most issues in my sector involve:	
	a) Consensus-based negotiations among stakeholders	3.79
	b) Reliance on existing regulations	2.71
	c) Reliance on experts and professionals	3.58
	d) Reliance on market-based instruments (e.g., carbon credit trading)	2.87
11.	Communities and municipal governments should have more power in making decisions in my sector	2.93
12.	Aboriginal concerns are adequately represented in forest related decisions	3.08
13.	Forests are managed successfully for a wide range of uses and values, not just timber	3.32
14.	My province has enough protected areas such as provincial and national parks or wilderness areas	2.97

15. Intensive forest management is a realistic forest management supplement to current practices 3.36
16. Forest regeneration practices are adequate 2.84
17. There will be sufficient forest growing stock in my province to meet future economic needs 2.92

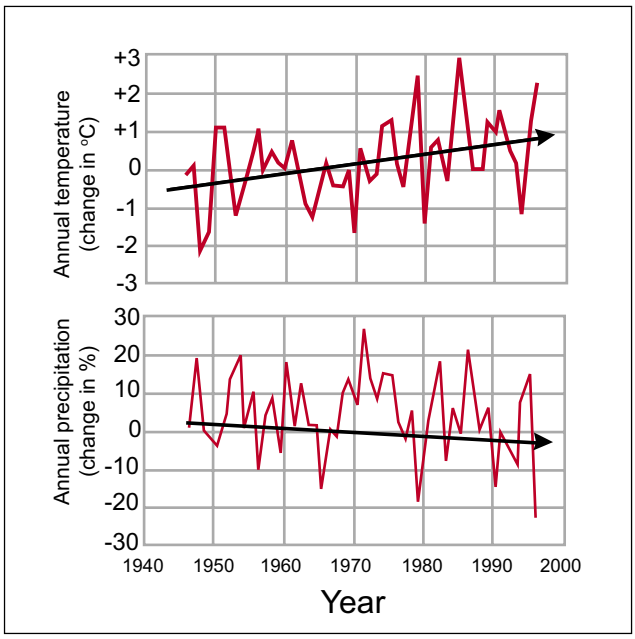
Part Two. Important Water Issues

The following items express perceptions about Prairie water issues. A score of 1 indicates strong disagreement with the statement, a score of 3 indicates a neutral response, while a 5 indicates strong agreement with the statement. NOp (9) indicates no opinion. Please respond from the perspective of your province/region.

		Mean Scores
1.	There is an adequate supply of water available for all prairie resource users	2.22
2.	Watersheds are adequately protected from forest operations	2.39
3.	Water contamination from farm-related activity is a serious water problem	3.72
4.	Water quality regulations are being adequately enforced	2.77
5.	The Canada-U.S. Air Quality Agreement Act has been successful in addressing acid rain	2.92
6.	Aborginal people should be accorded more control over water resources	2.54
7.	Canadian drinking water guidelines/standards should be strengthened	3.48
8.	Drainage of wetlands due to agricultural and other purposes is a critical issue	3.91
9.	Water management should be based on demand management in order to promote water efficiency	3.52
10.	The best strategies for resolving most issues in my sector involve:	
	a) Consensus-based negotiations among stakeholders	3.80
	b) Reliance on existing regulations	3.14
	c) Reliance on experts and professionals	3.58
	d) Reliance on market-based instruments (e.g., carbon-credit trading)	2.81
11.	Communities and municipal governments should have more power in making decisions in my sector	3.07
12.	The Federal government should allow bulk water exports	2.14

Part Three. The Science of Climate Change

Below are published graphs depicting average annual temperatures and precipitation for the Prairie Provinces over the past 60 years. The graph shows that the average temperature has increased by 1.6°C whereas precipitation may have declined. Please indicate how you interpret this data in the question below.



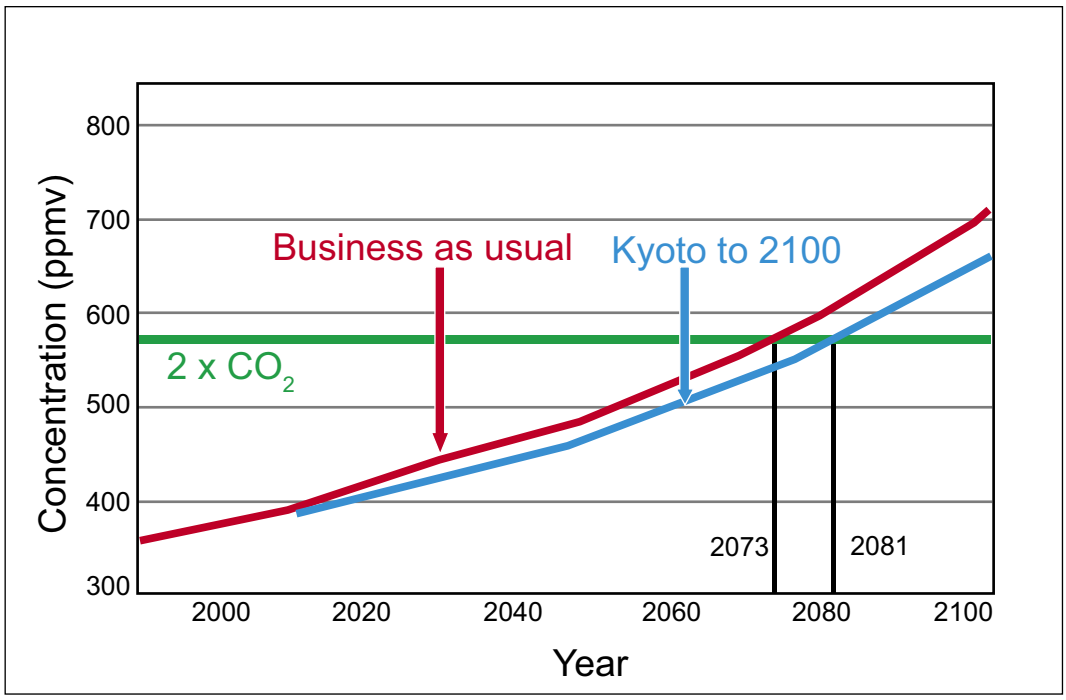
Source: Environment Canada

In my opinion, the above graphs are evidence of (choose one):

1.	Substantial climate change and represent an important issue for my sector	32.8%
2.	Substantial climate change but are not a critical issue for my sector	1.4
3.	Modest climate change and represent an important issue for my sector	35.9
4.	Modest climate change and are not a critical issue for my sector	5.5
5.	No climate change and are not a critical issue for my sector	0
6.	The data are inconclusive	21.3
7.	Unsure	3.2

Part Three. The Science of Climate Change (continued)

In this graph, the added blue line indicates what would happen to the CO_2 concentrations if the full Kyoto provisions for greenhouse gas reductions were adopted.



Source: Environment Canada, based in IMAGE 2 model output.

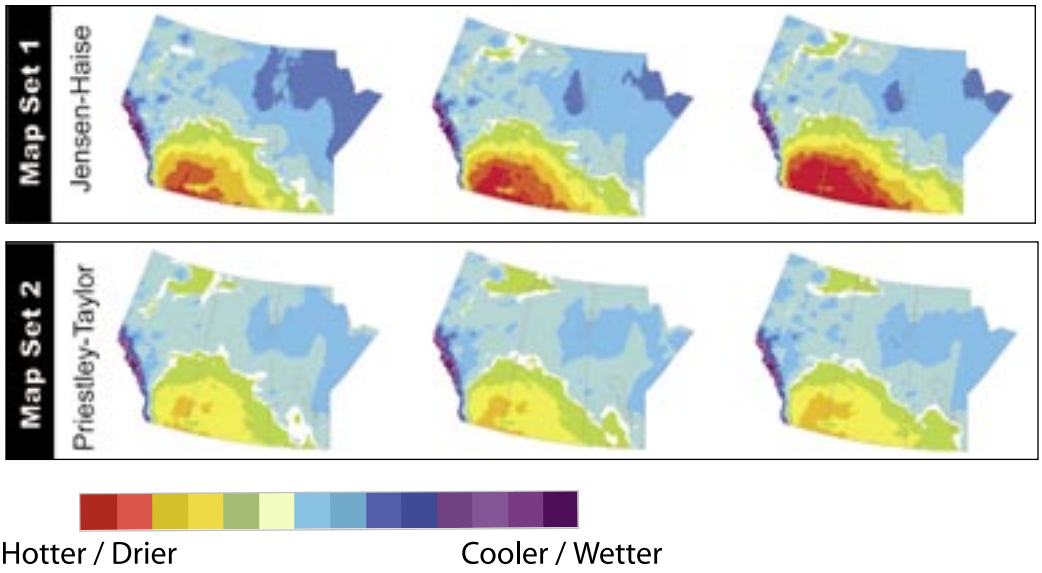
Based upon the evidence presented in the above graph: (choose 1)

1.	In light of this evidence, reducing greenhouse gases under proposed Kyoto targets still remains	13.7%
2.	Reducing greenhouse gases under proposed targets is only a short-term solution in a larger strategy of climate change policy options, including adaptation	51.6
3.	Reducing greenhouse gases under proposed targets will have very little impact on climate change mitigation	25.7
4.	2 x CO_2 will not have a great impact on the prairie provinces	1.5
5.	Unsure	7.6

Part Three. The Science of Climate Change (continued)

Scientists have developed complex computer simulations of future climates. Below are two common examples of these simulations that produce different possible future scenarios of projected climate conditions in the prairies over the next 70 years. Both Map Set 1 and 2 illustrate different Climatic Moisture Index (CMI) that take into account the drying power of the local climate. For more information about the CMI, Jensen-Haise, and Priestley-Taylor models click here.

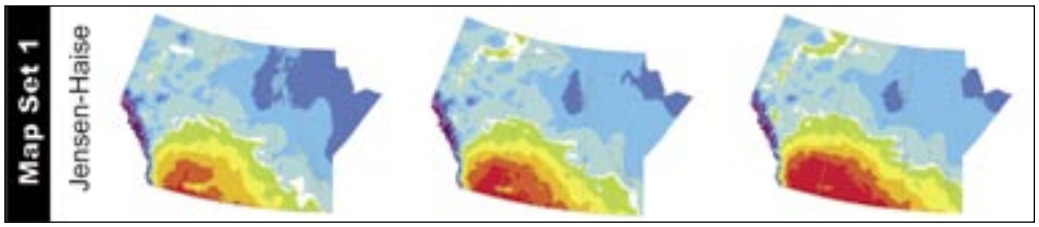
In the legend below, the temperature and dryness is greatest where the colors in the maps are red, whereas purple indicates the cooler temperatures and wetter conditions.



From the maps above (please select one of the following):

1.	Map Set 1 represents the most realistic outcome for future climate change	25.3%
2.	Map Set 2 represents the most realistic outcome for future climate change	14.6
3.	Neither Map Set is indicative of future climate change	12.6
4.	Unsure	47.5

Part Three. The Science of Climate Change (continued)

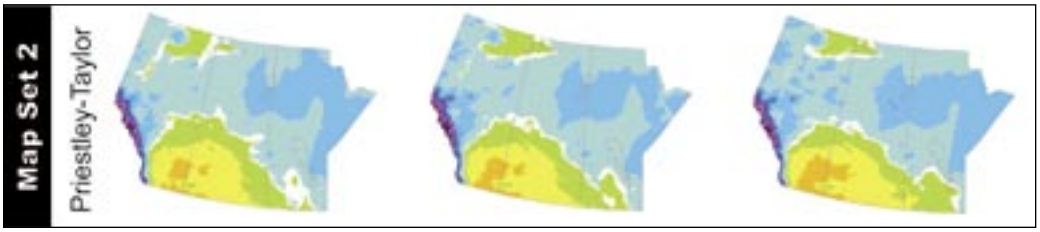


By choosing Map Set 1, then you think that changes to the prairie climate will occur in the... (please select one of the following)

1.	Short-term future (<10 years) and will have significant impacts requiring immediate policy action	27.0%
2.	Short-term future (<10 years) and will have modest impacts requiring long term policy action	6.7
3.	Long-term future (>10 years) and will have significant impacts requiring immediate policy action	47.2
4.	Long-term future (>10 years) and will have significant impacts requiring long-term policy action	16.1
5.	Long-term future (>10 years) and will have negligible impacts requiring little to no policy action	1.1
6.	Unsure	1.1

n=89

Part Three. The Science of Climate Change (continued)



By choosing Map Set 2, then you think that changes to the Prairie climate will occur in the... (please select one of the following)

1. short-term future (<10 years) and will have significant impacts requiring immediate policy action	0%
2. Short-term future (<10 years) and will have modest impacts requiring long-term policy action	11.5
3. Long-term future (>10 years) and will have significant impacts requiring immediate policy action	17.3
4. Long-term future (>10 years) and will have significant impacts requiring long term policy action	48.1
5. Long-term future (>10 years) and will have negligible impacts requiring little to no policy action	19.2
6. Unsure	3.8

n=52

Part Three - The Science of Climate Change (continued)

By choosing neither map set, then you think... (please select one of the following)

1. Both maps underestimate potential climate change impacts	6.7%
2. Both maps overestimate potential climate change impacts	4.4
3. The data presented in both map sets is too inconclusive	37.8
4. All future scenarios developed by climate change science is too inconclusive to make policy decisions on	44.7
5. Unsure	6.7

n=45

Part Three. Responsibility for Climate Change

Below we examine who you perceive to be responsible for climate change related impacts and adaptation on the prairies.

Who should be responsible for implementing climate change related IMPACT policies on the prairies? (check all that apply)

1. Individual consumers	61.8%
2. My department/organization	60.1
3. Private sector	69.4
4. Other provincial government departments	79.2
5. Other federal government departments	77.8
6. International government organizations	43.8
7. Nobody, it isn't an issue	1.7
8. Unsure	5.3

Who should be responsible for implementing climate change related ADAPTATION policies on the prairies? (check all that apply)

1. Individual consumers	59.6%
2. My department/organization	58.4

3.	Private sector	79.8
4.	Other provincial government departments	79.5
5.	Other federal government departments	75.6
6.	International government organizations	33.7
7.	Nobody, it isn't an issue	1.4
8.	Unsure	3.9

Part Four. Risk and Resource Management

Below are four risk related issues associated with a number of potential impacts of climate change.

For each risk related issue, please indicate the severity of the impact.

Extent of Impacts

For each impact, please rate the extent of this impact in your resource sector. Where a score of 1 indicates a very small scope and 5 indicates a very large scope. NOp (9) indicates no opinion.

1.	Decreased precipitation	4.43
2.	Increased average temperatures	3.87
3.	Increased precipitation	3.30
4.	Increased severity of extreme weather events	4.00

Control of Impacts

For each impact, please rate how controllable each impact is in your resource sector. Where 1 indicates easy to adapt and 5 indicates difficult to adapt. NOp (9) indicates no opinion.

1.	Decreased precipitation (droughts)	4.14
2.	Increased average temperatures	3.32
3.	Increased precipitation	2.78
4.	Increased severity of extreme weather events	3.83

Acceptance of Impacts

For each impact, please rate how acceptable each impact is in your resource sector. Where 1 indicates easy to accept and 5 indicates difficult to accept. NOp (9) indicates no opinion.

1.	Decreased precipitation (droughts)	4.27
2.	Increased average temperatures	3.20
3.	Increased precipitation	2.62
4.	Increased severity of extreme weather events	3.75

Predictability of Impacts

For each risk, please rate the predictability of each potential impact upon your resource sector. Where 1 indicates very little predictability and 5 indicates a great deal of predictability. NOp indicates no opinion.

1.	Decreased precipitation (droughts)	3.16
2.	Increased average temperatures	3.18
3.	Increased precipitation	2.88
4.	Increased severity of extreme weather events	2.55

Part Five. Organizational Issues

In developing your strategies for dealing with prairie resource issues, please indicate from the list below up to three (3) organizations on which you rely most heavily. Then indicate why you rely on them in determining your strategies. For each organization, please rank each of the four reasons listed below on a scale from 1 indicates not at all important 5 indicates extremely important.

- Shared Values/Policy Viewpoints
- Source of Valid Information
- Source of Innovative Ideas
- Organization has a lot of power

Choose from:

- Agriculture and Agri-Food Canada
- Prairie Farm Rehabilitation Administration
- Canada Grains Council
- Canadian Meat Council
- Canadian Cattlemen's Association
- Canadian Federation of Agriculture
- Canadian Pork Council
- Canadian Seed Growers' Association
- Canadian Special Crops Association
- Canadian Canola Growers Association
- Canola Council of Canada
- Con Agra Grain
- Crop Protection Institute
- Farm Credit Corporation
- United Grain Growers
- Western Barley Growers
- Western Canadian Wheat Growers
- Canadian Society for Soil Science
- Alberta Grain Commission
- Agricore
- Agriculture and Food Council of Alberta
- Alberta Barley Commission
- Alberta Canola Producers Commission
- Alberta Cattle Commission
- Alberta Cattle Feeders' Association
- Alberta Irrigation Projects Association
- Alberta Pulse Growers Commission
- Alberta Winter Wheat Producers Commission
- Wild Rose Agricultural Producers
- Alberta Institute of Agrologists
- Alberta Applied Research Association
- University of Alberta
- University of Calgary
- University of Lethbridge
- Alberta Conservation Tillage Association
- Saskatchewan Agriculture and Food
- Saskatchewan Crop Insurance Corporation
- Saskatchewan Canola Growers Association
- Saskatchewan Cattle Feeders Association
- Saskatchewan Pulse Growers
- Saskatchewan Wheat Pool
- Saskatchewan Winter Cereal Growers
- Saskatchewan Institute of Agrologists
- University of Regina
- University of Saskatchewan
- Saskatchewan Soil Conservation Association
- Manitoba Agriculture
- Manitoba Crop Insurance Corporation
- Keystone Agricultural Producers
- Manitoba Canola Growers Association
- Manitoba Cattle Producers Association
- Manitoba Chicken Producers
- Manitoba Forage Council
- Manitoba Seed Growers' Association
- Manitoba Institute of Agrologists
- University of Manitoba
- University of Winnipeg
- Environment Canada
- Environmental Conservation Service
- Environmental Protection Service
- Meteorological Service of Canada
- Natural Resources Canada
- Climate Change Secretariat
- Geological Survey of Canada
- Canadian Aquaculture Industry Alliance
- Canadian Water Resources Association
- Canadian Water and Wastewater Association
- Western Canada Water and Wastewater Association
- Western Canada Water Environment Association
- Alberta Water and Wastewater Operators
- Association of Professional Engineeers, Geologists
- Canadian Nature Federation
- David Suzuki Foundation
- Environment Probe
- Friends of the Earth
- Greenpeace
- Sierra Club
- Western Canada Wilderness Committee
- World Wildlife Fund
- Alberta Environment
- Climate Change Central
- Alberta Environmental Network
- Alberta Fish and Game Association

- Alberta Fish Farmers Association
- Alberta Soil and Water Conservation Society
- Pembina Institute
- Friends of the Athabasca
- Ducks Unlimited
- Trout Unlimited
- Prairie Association for Water Management
- Saskatchewan Environment and Resource Management
- Saskatchewan Water and Wastewater Association
- Saskatchewan Water Corporation
- Saskatchewan Wetland Conservation Corporation
- Meewasin Valley Authority
- Saskatchewan Ground Water Association
- Soil and Water Conservation Society
- Saskatchewan Environmental Society
- Manitoba Conservation
- Delta Waterfowl Foundation
- Waterwatch
- Manitoba Eco-Network
- Assembly of First Nations
- Metis National Council
- Canadian Aboriginal Science and Technology Society
- Treaty 7 Tribal Council
- Metis Nation of Alberta
- Federation of Saskatchewan Indian Nations
- Manitoba Keewatinowi Okimakanak
- Centre for Indigenous Environmental Resources
- Assembly of Manitoba Chiefs
- Canadian Forest Service
- Canadian Pulp and Paper Association
- Canadian Sustainable Forestry Certification Association
- Council of Forest Industries
- Pulp and Paper Research Institute of Canada
- Forest Engineering Research Institute
- Canadian Lumbermean's Association
- Canadian Institute of Forestry
- International Institute for Sustainable Development
- Canadian Forestry Association
- Canadian Parks and Wilderness Association
- Forest Stewardship Council
- Land and Forest Service
- Alberta Forest Products Association
- Sundance Forest Industries
- Alberta Newsprint Company
- Alberta Pacific Ltd.
- Canfor Ltd.
- Daishowa-Marubeni International Ltd.
- Manning Diversified Forest Products
- Millar Western Forest Products Ltd.
- Tolko Industries Ltd.
- Weldwood of Canada Ltd.
- Weyerhaeuser Company
- Alberta Registered Professional Foresters
- Alberta Society of Professional Biologists
- Canadian Institute of Forestry
- Foothills Model Forest
- National Centre of Excellence
- Alberta Wilderness Association
- Federation of Alberta Naturalists
- Saskatchewan Environment and Resource Management
- Council of Saskatchewan Forest Industries
- Saskatchewan Council of Independent Forest Industries
- Central Forest Products Association
- Clearwater Forest Products
- Mistik Management
- NorSask Forest Products Partnership
- Suntec Forest Products
- Saskatchewan Environmental Managers Association
- Prince Albert Model Forest
- Saskatchewan Forest Conservation Network
- Native Plant Society of Saskatchewan
- Nature Saskatchewan
- Saskatchewan Forestry Association
- Saskatchewan Action Foundation for the Environment
- Saskatchewan Eco-Network
- Manitoba Model Forest
- Manitoba Forestry Association
- Manitoba Future Forest Alliance

From the same list, please identify up to three (3) organizations you regard as allies. For each group, please indicate how often you engage in the following four activities with that group. Indicate according to the scale below from 1 indicates never 5 indicates very often.

- Share information
- Voluntarily modify my organization's behaviour to achieve common goals
- Develop a joint policy position and/or strategy

Please indicate up to three (3) organizations you regard as your principal opposition.

Part Six. General Policy Attitudes

The following statements express general opinions about government, institutions, public policies, and the environment. Please circle the number that comes closest to expressing your opinion on a scale from 1 indicates strongly disagree to 5 indicates strongly agree. NOp (9) indicates no opinion.

		Mean Scores
1.	A first consideration of any good political system is the protection of property rights	3.26
2.	The balance of nature is very delicate and easily upset by human activities	3.59
3.	The best government is the one that governs the least	2.77
4.	Ecological rather than economic factors must guide our use of natural resources	3.30
5.	Decisions about development are best left to the economic market	2.33
6.	We attach too much importance to economic measures on the well-being of our society	3.40
7.	We are approaching the limit of the number of people the earth can support	3.33
8.	When humans interfere with nature it often produces disastrous consequences	3.25
9.	Humans must live in harmony with nature in order to survive	4.14
10.	Most environmental problems can be solved by applying more and better technology	2.76
11.	Plants and animals exist primarily to be used by humans	2.28
12.	There are limits to growth beyond which our industrialized society cannot expand	3.93

Part Seven. About You

In the final section are background socio-demographic questions relating to your age, gender, occupation, and education.

1. What is your principal occupation / profession?

   - Business person 1.8
   - Attorney 0.3
   - Consultant 4.8
   - Planner/Architect 2.1
   - Engineer Scientist 14.0
   - Manager 22.3
   - Journalist 0.3
   - Farmer 3.3
   - Professional Forester 6.7
   - Agrologist 10.4
   - Civil Servant 25.6
   - Elected official 1.8

2. How many years have you been in your present organization?

   - less than 1 year 6.2%
   - 1-5 years 21.5
   - 6-9 years 15.3
   - 10-14 years 13.6
   - 15-20 years 13.0
   - greater than 20 years 30.4

3. Which of the following best describes your principal employer(s)?

   - Agricultural producer organization 9.5
   - Forest industry organization 5.7
   - University 6.3
   - Government agency 61.0
   - Environmental organization 5.7
   - Fishing or sport club 0.3
   - Consulting firm 3.3
   - Self-employed 6.8
   - Corporation 1.5

4. What is your age?

   - Under 21 0.3
   - 21-30 7.3
   - 31-40 17.7
   - 41-50 39.1
   - 51-60 30.3
   - Over 60 5.2

5. What is the highest level of education you have attained?

- Not a high school graduate 0.6
- High school graduate 1.7
- Some college 10.4
- Bachelor's degree 33.1
- Law Degree (LL.B.) 0.6
- Master's or professional degree 33.7
- Ph.D. or MD 14.3

6. If you have a university degree, in which of the following fields is it?

- Agriculture 22.0
- Physics 2.4
- Chemistry 2.1
- Forestry 11.0
- Engineering 12.4
- Earth/resource sciences 12.4
- Biology or ecology 15.8
- Economics 6.9
- Law 0.7
- Planning 4.1
- Other social sciences 5.5
- Education 2.1
- Humanities or fine arts 2.6

7. What is your gender?

- Male 82.2%
- Female 17.8

8. What is your family status?

- Single Married or Common law without children 11.9
- Married or Common law with children 73.3
- Separated or Divorced without children 1.5
- Separated or Divorced with children 3.0
- Widowed 0.9

APPENDIX 4
Homogeneity of Variances and Tukey's *b* Scores for Deep Normative Core Beliefs and Policy Core Beliefs

Table A4-1. Test of homogeneity of variance and Tukey's *b* score for deep normative core beliefs

Deep normative core belief	Levine statistic	df1	df2	*p*
Protection of property rights	0.310	6	101	0.930
Balance of nature is delicate	1.277	6	104	0.274
Best government is the one that governs the least	1.005	6	99	0.427
Ecological factors should guide natural resource use	1.426	6	105	0.211
Economic market is important	0.485	6	105	0.818
Too much importance attached to economic measures	1.440	6	105	0.206
Must limit the number of people on earth	3.080	6	99	0.008
Human interference with nature leads to disaster	0.865	6	104	0.524
Humans must live in harmony with nature	4.569	6	104	0.000
More technology can solve environmental problems	1.272	6	106	0.277
Plants and animals exist primarily to be used by humans	2.234	6	102	0.046
There is a limit to growth	0.849	6	103	0.535

Note: df = degrees of freedom.

Table A4-2. Mean scores for deep normative core beliefs with nonsignificant *F* values[a]

Organization type	*n*	Mean score
Balance of nature is delicate		
Forest industry	23	3.1
Natural Resources Canada	10	3.1
Consultants	7	3.3
Provincial environment agencies	45	3.3
Other	9	3.8
Environmental groups	8	3.9
Research institutions	9	3.9
Best government is the one that governs the least		
Research institutions	8	2.4
Environmental groups	6	2.7
Other	9	2.7
Provincial environment agencies	45	2.8
Natural Resources Canada	9	2.9
Forest industry	22	3.2
Consultants	7	3.4
Economic market is important		
Environmental groups	9	1.6
Other	9	1.9
Consultants	7	2.3
Natural Resources Canada	10	2.3
Provincial environment agencies	45	2.3
Forest industry	23	2.7
Research institutions	9	2.7
Too much importance attached to economic measures		
Forest industry	23	3.0
Other	9	3.3
Provincial environment agencies	45	3.4
Consultants	7	3.7
Research institutions	9	3.8
Natural Resources Canada	10	3.9
Environmental groups	9	4.2
Must limit the number of people on earth		
Forest industry	22	2.9
Natural Resources Canada	10	3.2
Other	8	3.4
Provincial environment agencies	41	3.6
Research institutions	9	3.8
Environmental groups	9	3.9
Consultants	7	4.4
Plants and animals exist primarily to be used by humans		
Other	9	1.3
Natural Resources Canada	10	1.4
Environmental groups	9	1.7
Research institutions	9	1.9
Consultants	7	2.1
Forest industry	20	2.3
Provincial environment agencies	45	2.3
There is a limit to growth		
Natural Resources Canada	10	3.4
Forest industry	21	3.7
Other	9	4.0
Provincial environment agencies	46	4.2
Environmental groups	8	4.8
Consultants	7	4.4
Research institutions	9	4.4
Factored economic deep normative core belief		
Other	8	2.1
Environmental groups	6	2.3
Research institutions	8	2.4
Natural Resources Canada	9	2.4
Provincial environment agencies	44	2.7
Consultants	7	2.8
Forest industry	18	2.9

[a]For beliefs where $p > 0.05$ by analysis of variance. Presented in order of increasing mean score.

Table A4-3. Test of homogeneity of variance for forest-related policy core beliefs

Policy core belief	Levine statistic	*p*
Legislation promotes SFM	4.002	0.001
Forest biodiversity is threatened	1.589	0.159
Forest practices that mimic natural disturbances are best	3.737	0.002
Expansion of the forest industry is good for economy	1.285	0.272
Fire suppression is adequate	0.653	0.688
Insect suppression is inadequate	0.586	0.741
Environmental groups and media exaggerate environmental damage	2.109	0.059
Forest companies should have more property rights	0.650	0.690
Fish and wildlife stocks are good	0.952	0.463
Aboriginal concerns are represented	1.755	0.117
Forests are managed for a wide range of uses	1.681	0.134
Enough protected areas exist	2.084	0.063
Intensive forest management is realistic	3.530	0.004
Forest regeneration is adequate	1.228	0.299
Growing stock is sufficient	1.162	0.334
Resolve issues by consensus	2.297	0.041
Resolve issues by regulation	1.673	0.135
Resolve issues by experts and professionals	1.053	0.396
Resolve issues by market-based instruments	1.782	0.111

Note: SFM = sustainable forest management.

Table A4-4. Mean score for policy core beliefs with nonsignificant *F* values[a]

Organization type	*n*	Mean score
Fire suppression is adequate		
Research Institutions	8	2.4
Environmental groups	7	2.6
Consultants	5	2.6
Other	7	2.9
Forest industry	22	3.1
Natural Resources Canada	10	3.2
Provincial environment agencies	40	3.2
Insect suppression is inadequate		
Environmental groups	7	2.9
Provincial environment agencies	41	3.1
Natural Resources Canada	10	3.1
Research Institutions	7	3.1
Forest industry	19	3.2
Other	6	3.2
Consultants	4	3.3
Forest companies should have more property rights		
Consultants	4	1.3
Environmental groups	8	1.6
Provincial environment agencies	43	1.7
Other	8	1.8
Natural Resources Canada	10	1.9
Research institutions	9	2.2
Forest Industry	19	2.5
Intensive forest management is realistic		
Other	7	2.6
Environmental groups	8	2.9
Provincial environment agencies	37	3.4
Forest industry	19	3.5
Natural Resources Canada	10	3.6
Research institutions	8	3.8
Consultants	5	3.8
Resolve issues by consensus		
Environmental groups	9	3.2
Consultants	5	3.4
Research institutions	8	3.6
Provincial environment agencies	44	3.8
Other	8	3.9
Forest industry	23	3.9
Natural Resources Canada	10	4.3
Resolve issues by experts and professionals		
Other	8	3.0
Natural Resources Canada	10	3.3
Environmental groups	9	3.4
Forest industry	23	3.6
Research institutions	8	3.6
Provincial environment agencies	46	3.7
Consultants	6	4.2
Resolve issues by market-based instruments		
Environmental groups	8	2.3
Consultants	6	2.3
Other	7	2.67
Natural Resources Canada	10	2.8
Research institutions	8	2.9
Provincial environment agencies	45	2.9
Forest industry	21	3.2

[a]For beliefs where $p > 0.05$ by analysis of variance. Presented in order of increasing mean score.

Table A4-5. Test of homogeneity of variance for forest-related policy core beliefs (by category)

Type of belief	Levine statistic	df1	df2	*p*
Management beliefs	4.302	6	74	0.001
Protection beliefs	1.204	6	85	0.312

Note: df = degrees of freedom.

Table A4-6. Mean scores for forest-related policy core beliefs (protection)[a]

Organization type	*n*	Mean score
Environmental groups	7	2.7
Research institutions	7	2.8
Consultants	4	3.0
Other	6	3.1
Forest industry	19	3.1
Natural Resources Canada	10	3.2
Provincial environment agencies	39	3.2

[a]For policy beliefs where $p > 0.05$ by analysis of variance. Presented in order of increasing mean score.