

PUBLIC BELIEFS ABOUT ENVIRONMENTAL ISSUES IN CANADIAN NATIONAL PARKS

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Dedication

This paper is dedicated to Robert Graham, whose friendship and commitment to this project and to the parks of Canada will not be forgotten.

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Creation and operation of national parks and protected areas has a profound effect on the social, as well as physical, environment. Several research efforts have alluded to those impacts, but few have dealt with the role of local residents (either inside or near the parks) in assessing, monitoring or managing those impacts. Similarly, few studies have relied on those residents as information sources related to the park environment or as major knowledge bases related to environmental impacts on or near park boundaries.

Recent research on park management has called for the Canadian Parks Service to extend its management efforts beyond park boundaries (Paine, Rollins, Tamm and Nelson, 1991). Noting that parks and protected areas in northern Canada have neighbors (the public), Paine, *et al.* (1991) have described some impacts which these parks and protected areas have on those neighbors. As Paine, *et al.* note, both new and established parks have major impacts on the ways people use the region in which the park is located.

Messerschmidt (1986), however, sees the need to develop appropriate strategies for involving local participation in park planning and management. Messerschmidt

notes that practically all natural areas today bear the mark of human activity in some form. Local communities often have a profound knowledge of their ecosystem ordinarily untapped by park management.

Boulding's (1985) suggestion that knowledge is of two kinds: "folk" knowledge, or the knowledge of local peoples, and "scholarly" knowledge, information of the type learned through books or other formal means, may be important in obtaining an accurate consensual picture of the ecosystem. In what may be seen as a reversal of common descriptions, Boulding notes that whereas much of our folk knowledge comes from actual testing and experience, most scholarly knowledge is not tested, but is taken on hearsay and trust from the sources. From Boulding's perspective, it is difficult to justify the low credibility attached to information gleaned from local, rather than expert, sources.

An empirical study (Doble and Johnson, 1991) also suggests that the public is quite capable of dealing with complex technical issues. Doble and Johnson found that, after watching a 15-minute video on global warming and discussing the issues among themselves, a cross-section of the general public completed a questionnaire and expressed views "strikingly similar" to those expressed via questionnaire by 418 scientists concerned with the issue.

Research Questions: This paper investigates the relation between public perception of environmental problems facing the national parks they live in or near, and expert opinion about those issues. We explore the following research questions:

- 1) Do local residents hold consensus regarding the most important environmental stressors facing the park?
- 2) Is there consensus concerning the impact of major environmental stressors associated with the park?
- 3) How much consensus is there between experts and locals in assessing the impacts of the environmental stressors?
- 4) What specific problems do locals see as the most important environmental problem facing the park?

- 5) On whom do locals place primary blame for what they perceive as the worst environmental problem facing the park?
- 6) What is the relationship, if any, between those problems seen by local residents as most important for the park and the degree of consensus between local residents and the experts?

Method

We analyze data collected in two separate studies of environmental issues affecting national parks in Canada. The first study, the Canadian Parks Service Stress Questionnaire (the “expert” survey, developed by Woodley, 1992) , employed a panel of experts in ecology to assess the significant impacts of various ecological and anthropogenic stressors in each of twenty national parks. The second study, Widespread Beliefs about Environmental Issues (the “public” survey, developed by McDonald and Glynn, 1993), asked 882 people living in or near six Canadian national parks what they saw as the worst environmental problem facing the park, and how serious a problem each of the environmental stressors (previously identified in the stress survey) was for their particular park.

The Expert Survey: For each park, data for the stress survey was collected through a questionnaire and completed by a group of from three to five knowledgeable people, including park wardens, interpreters, regional specialists, external management agency personnel and university professors. Instructions specified that the group would include a mix of different backgrounds and positions.

The Public Survey: Eight hundred and eighty-two people living in or near six Canadian national parks were asked what they saw as the worst environmental problem facing the park, and how serious a problem each of several environmental stressors (previously identified in a Parks Canada survey of experts) was for their particular park. The parks were: Point Pelee, Georgian Bay Islands, Banff, Jasper, Prince Edward Island and Cape Breton Highlands National Parks. The questionnaire was structured to obtain closed-ended responses to 1) a series of environmental stressors identified in the stress survey as associated with certain parks; 2) perceptions of impacts associated with those stressors; 3) an open-ended question ascertaining the “worst environmental problem affecting the park right

now;” and 4) closed-ended responses to a matrix of items ascertaining the respondent’s assignment of responsibility for the problem they had listed as the worst problem facing the park.

The survey attempted to obtain beliefs about environmental stressors from as wide a range of residents as possible. We employed several methodologies. The primary method for data collection was a “drop-off” technique for delivering questionnaires to residents of small cities and towns in or near the parks during the summer of 1993. By this technique, approximately 200 questionnaires (accompanied by an introductory letter) were hung in bags on the doorknobs or other conspicuous places by the main residence entrance. Instructions asked residents over 18 to fill out the questionnaires and place them back in the bag and rehang them in approximately the same location, where they would be picked up within the next two nights.

In addition to the drop-off method we employed the mall-intercept method where that technique was appropriate (i.e., when the town had a mall or large shopping area), and for one park, simply left a small stack of questionnaires and sign explaining the survey on a counter in a coffee shop frequented by locals.

Response rates are difficult to determine exactly because some homes were vacant, unoccupied, or the resident was absent. In addition, in a few instances, persons under 18 years of age had completed the questionnaire, and the questionnaire was eliminated from the sample. Table 1 provides an overview of the survey datasets and the number of respondents associated with each.

Our primary method of analysis will be factor analyses of closed-ended responses to obtain a profile reflecting the responses associated with each research question for the parks combined, followed by an examination of the open-ended question ascertaining the most important environmental problem. Each analysis will center on overall problems across the parks, and then on examination of similarities and differences between the parks.

Results

Stressors: Table 2 presents the mean ratings of each of 12 potential environmental stressors. As is evident from the table, the problems associated with each of the parks is perceived in a different light by local residents. Results may be examined either by park, highlighting the major problems associated with the park, or by stressor, highlighting the park most associated with that stressor. Locals living near Point Pelee, for example, perceive pesticides, solid waste and sewage as the major stressors. Locals living near the Georgian Bay Islands also perceive pesticides, solid waste and sewage as problems, but also perceive impacts from petrochemical products and overuse of the park. Banff and Jasper are similar in that locals perceive major impacts from overuse and development of the park, with primary concern focused on urbanization, overuse, solid waste, sewage and tourism. Prince Edward Island residents see urbanization, pesticides, solid waste and sewage as primary stressors for the park there, and Cape Breton residents see few major stressors, although pesticides and solid waste appear to be the most serious stressors in their view.

Impacts: The checklist of environmental stressors provides a glimpse into residents' perceptions of environmental problems. To augment that information we asked respondents to use a similar rating scale to assess environmental impacts associated with the parks (Table 3). Again, some of the parks were similar in their profiles, but each emerges as unique in residents' perceptions of the problems the park is facing. Point Pelee and the Georgian Bay Islands again appear somewhat similar, with soil and water pollution, changes in the water and decreases in wildlife as important perceived effects of the stressors. Banff and Jasper are also similar to each other in residents' perception of habitat destruction and soil and water pollution. Banff residents perceive greater impacts in changes to the land and water while Jasper residents are more likely to perceive fewer wildlife. The primary impact in Prince Edward Island is perceived to be changes to the land while Cape Breton residents see fewer wildlife and acid rain as major impacts for the Highlands park (all differences reported above significant at $p < .05$).

Classes of Stressors and Impacts: To assess consensus among residents as to classes or types of stressors and impacts, we conducted a factor analysis using principal components extraction and varimax rotation (Table 4). As is evident from the table,

both the stressors and the impacts fell into three broad types (Borgatti, 1992; Romney, Weller and Batchelder, 1986).

Stressor Types. We labeled the three stress factors “pollution” (loading heavily on pesticides, solid waste, sewage and petrochemicals), “extraction” (loading on mining, forestry, exotic fish and plants), and “development” (with high loadings on overuse, urbanization, and tourism). The pattern of eigenvalues shows fairly strong consensus for the factor pattern (Borgatti, 1992).

Impact Types. The factor structure which emerges with the analysis of the impacts suggests three factors which we labeled “physical changes” (air pollution, soil/water pollution, habitat destruction, and land changes), “animal destruction” (fewer wildlife and less species diversity, and physical changes in animals) and “rain/water changes” (reflecting impacts in water changes and acid rain). Again the factor loading pattern shows a reasonable consensus as to the grouping of the impacts.

Worst Environmental Problems: Our open-ended ascertainment of the worst environmental problem facing the park right now yielded 104 different responses. These were recoded into eight major problem areas: Development/urbanization, extraction of resources, pollution, visitors/activities, political actors/management actions, land changes, plant/animal changes, and water changes. Results of the analysis of this question are presented in Table 5, which presents the percentage of respondents of each park who named a problem associated with one of the categories. One of the striking aspects of Table 5 is the number of blank cells in the table, again suggesting the degree of consensus which residents have about certain problems facing the park. While none of the problem categories is completely blank for all parks, only four of the eight were mentioned by at least one person in every park (development, visitors, political actors and plant/animal changes).

Half of the respondents in Point Pelee pointed to extraction of natural resources as a primary problem, 60% of Georgian Bay residents suggested that the primary problem was pollution, 55% of Banff residents and 44% of Jasper residents see development as the major problem, Prince Edward Island residents see the major problem in visitors and their activities, and 49% of Cape Breton respondents

suggested that pollution was the worst environmental problem facing Cape Breton Highlands.

Blame for Environmental Problems: A closed-ended listing of 11 possible actors associated with environmental issues in parks was provided for respondents to check the extent of responsibility each had for the problem they named as the worst environmental problem facing the park. We subjected the matrix of responses to a factor analysis (same method as above) to test for “blame” factors (Table 6). As is evident from the table, blame for the problem also factored into three major actor/action types: visitors (tourists, birders, locals, hikers, campers and bikers), extractors (loggers and miners), and political actors (environmentalists, park officials, locals and government officials). The eigenvalues associated with these factors suggest even greater consensus than suggested before.

The extent of consensus reflected in environmental problems and blame is illustrated graphically in Figures 1 through 3, where a bar chart is used to visually depict the similarities and differences between parks. In Figure 1, the major stressors are clearly different for the six parks, with pollution most clearly a concern for Point Pelee and Georgian Bay, while development was a clear concern for Banff and Jasper. PEI stress appears to be close to average for all three factors while Cape Breton Highlands stress is quite low for pollution and development.

The three impact “factors” have been graphed with a mean of 0 so that positive values reflect higher perceived impact than average, while negative values reflect a low perceived impact. As is evident from the figure, Georgian Bay Islands and Banff are most clearly separated from each other in terms of the environmental impacts which are perceived to be operating at each park. Georgian Bay Islands shows those impacts most clearly in the water surrounding the islands; Banff impacts are perceived to center on the land.

Blame for what is perceived to be the worst environmental problem is presented as Figure 3, which also provides a clue to the degree of consensus surrounding the problems and their causes. As is evident from the figure, respondents in Point Pelee, Georgian Bay Islands and Cape Breton Highlands all listed extractors as those causing the major environmental problem for the park. Prince Edward Island

and Georgian Bay area residents place some blame on visitors as well, and Banff and Jasper residents place the majority of the blame for the park's worst problem on politicians and park management.

Discussion

This study demonstrates that ordinary people's perceptions of environmental issues may form an important contribution to collective definition of environmental issues and problems. Whether asked in closed-ended or open-ended form, people living near six national parks in Canada provided a consensus as to the major environmental stressors, the impact of those stressors on the environment, the *worst* environmental problem facing the park, and appear to have a coherent belief system assigning responsibility for the worst environmental problem the park is facing.

Results of the factor analyses suggest that these perceptions are clearly interpretable as factors or dimensions of perceived stressors, impacts and blame. In addition, for most of the six parks studied here, a clear perception of the single-worst problem facing each park emerged from the analysis of the grouped problem types. In spite of the fact that the open-ended question yielded more than 100 different responses, when grouped into eight categories, 5 of the 6 parks had a single category holding more than 40% of the problems reported by respondents, even further evidence that local residents have clear perceptions of the major environmental issues facing their area.

While scientific knowledge is indispensable to an understanding of environmental problems, the results of this study suggest that everyday knowledge of local people may be important in bringing specific issues to the forefront of discussion and/or remedial action. This study takes a somewhat different tact from that of previous studies of environmental knowledge (e.g., Arcury, 1990) by assuming that local residents may have an important kind of knowledge because of their first-hand experience of the local environment. This type of knowledge may be an important source of information for scientists and policymakers who may make decisions based on cursory examination or incomplete data. It is evident from this study that ordinary citizens have clear conceptions of environmental problems facing the parks they live in or near. This kind of knowledge may be valuable in

developing further public support for particular efforts in scientific research or attempts to remedy environmental problems. Most environmental problems are social in origin; it would appear to be appropriate and useful to involve the public and public knowledge of issues, problems and responsibility in defining environmental issues slated for social action.

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Table 1
Data Sets and Their Construction

Data Collection	Parks	Point Pelee	Georgian Bay Islands	Banff	Jasper	Prince Edward Island	Cape Breton Highlands
Drop-off		90	122	107	108	81	213
Mall/ Shop			66			95	
Total		90	188	107	108	176	213

Table 2
Mean Perceptions of Environmental Stressors for the Six Parks (5-point Scale)

Parks	Point Pelee	Georgian Bay Islands	Banff	Jasper	Prince Edward Island	Cape Breton Highlands
overuse	1.82	2.08	2.20	2.05	1.93	1.31
agriculture	1.60	1.60	1.16	1.14	1.57	1.18
urbanization/ development	1.71	1.99	2.51	2.22	2.11	1.31
pesticides	2.00	2.21	1.59	1.81	2.11	1.74
solid waste	2.09	2.41	2.18	2.09	2.14	1.69
exotic plants/ animals	1.53	1.85	1.68	1.66	1.58	1.44
mining	1.27	1.52	1.21	1.17	1.23	1.22
forestry	1.61	1.66	1.53	1.28	1.49	1.53
fishing	1.67	1.75	1.52	1.53	1.51	1.52
sewage	2.13	2.44	2.14	2.04	2.02	1.57
petrochemical products	1.87	2.37	1.72	1.64	1.91	1.42
tourism	1.78	1.95	2.13	2.03	1.88	1.38

Note: For each stressor, the differences between park means was statistically significant at $p < .01$.

Table 3
Mean Perceptions of Environmental Impacts for the Six Parks (5-point Scale)

Impact	Parks	Point Pelee	Georgian Bay Islands	Banff	Jasper	Prince Edward Island	Cape Breton Highlands
air pollution		1.77	1.53	1.93	1.93	1.46	1.45
soil/ water pollution		2.30	2.27	2.00	2.05	1.97	1.63
fewer wildlife		2.00	2.12	1.93	2.09	1.96	1.94
fewer species		1.84	1.96	1.82	1.86	1.86	1.79
physical changes to animals		1.41	1.37	1.75	1.71	1.24	1.29
habitat destruction		2.01	1.92	2.34	2.13	1.98	1.58
changes to the land		1.93	1.98	2.32	1.93	2.35	1.64
changes to the water		2.11	2.45	2.12	1.78	1.71	1.60
acid rain		1.90	2.14	1.30	1.36	1.73	1.93

Note: For each impact, the differences between park means were statistically significant at $p < .01$.

Table 4
Results of Factor Analysis of Environmental Stressors and Impacts in Six Parks
(rotated factor matrices)

	Factor Labels		
	Pollution	Extraction	Development
Overuse	.21	.07	.83
Agriculture	.49	.34	.07
Urbanization	.38	.20	.62
Pesticide	.74	.30	.09
Solid waste	.78	.12	.32
Exotic plants	.31	.47	.29
Mining	.25	.78	.04
Forestry	.18	.84	.04
Exotic fish	.18	.60	.31
Sewage	.77	.14	.29
Petrochemicals	.78	.28	.14
Tourism Impacts	.09	.13	.84
Eigenvalue	5.05	1.38	1.03
Variance (%)	42.0	11.5	8.6
	Land/Eco Impacts	Animal Destruction	Rain/Water Changes
Air pollution	.66	.14	.05
Soil/water poll.	.64	.18	.36
Fewer wildlife	.19	.86	.21
Less diversity	.16	.88	.20
Physical changes	.45	.48	-.29
Habitat destruction	.75	.27	.05
Land changes	.72	.07	.22
Water changes	.37	.21	.57
Acid rain	.06	.10	.82
Eigenvalue	3.53	1.05	1.01
Variance (%)	39.2	11.7	11.3

Table 5
**Categories of Most Important Environmental Problems Described
 in Open-Ended Assessment**

Problem Category	Parks	Point Pelee	Georgian Bay Islands	Banff	Jasper	Prince Edward Island	Cape Breton Highlands
Development/ Urbanization		.03	.03	.55	.44	.10	.04
Extraction		.50				.03	.03
Pollution			.60	.07	.11	.26	.49
Visitors/ Activities		.15	.28	.08	.19	.35	.06
Political Actors		.09	.02	.15	.15	.04	.10
Land Changes		.11	.01	.01		.03	.01
Plant/ Animal Changes		.12	.05	.13	.12	.20	.25
Water Changes			.01	.01			.03

Note. Table entries are percentages reporting the “most important environmental problem” associated with that category. Due to rounding, percentages may not equal exactly 100%.

Table 6
**Results of Factor Analysis of Respondent Blame for Environmental Problems in
 Six Parks (rotated factor matrices)**

	Factor Labels		
	Visitors	Extractors	Politicians/Mgmt
Tourists	.82	.10	.05
Environmentalists	.29	.24	.71
Birders	.54	.41	.39
Park Officials	.23	.05	.88
Locals	.50	.20	.46
Loggers	.23	.87	.17
Hikers	.75	.37	.31
Miners	.18	.87	.18
Government Offcls.	.00	.18	.83
Campers	.87	.26	.13
Bikers	.75	.41	.24
Eigenvalue	6.88	1.50	1.17
Variance (%)	52.9	11.6	9.0

Nota:

We cannot read the Figures 1 and 2 in this text. Please, see the author.