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Saskatchewan River Basin-Wide Survey of Residents' Attitudes Towards Water Resources and the Environment

by Maxwell Ofosuhene

August, 2003

Building Healthy Sustainable Communities

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Community – University Institute for Social Research

289 John Mitchell Building
118 Science Place
Saskatoon, SK S7N 5E2
phone (306) 966-2121
fax (306) 966-2122
e-mail cuisr.liason@usask.ca

CUISR acknowledges the following for their contributions to this publication:

Maxwell Ofosuhene, Researcher and Author
Susan Lamb, Director, Partners for the Saskatchewan River Basin (PFSRB)
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ABSTRACT

This report updates a study first conducted in 1994. It seeks to identify possible changes in Saskatchewan River Basin residents' attitudes and perceptions on water resources and environmental issues. A random sample of 267 residents was surveyed between August 2002 and February 2003. This sample consisted of 116 residents from Alberta, 76 from Saskatchewan, and 75 from Manitoba, all of whom were 18 years of age or older. There were slightly more female than male respondents (52% and 48%, respectively) and the average age was 47.1 years. On average, most respondents had lived in the River Basin for 25 years, with an average household income of $45,039.49. More than half (61%) had acquired a post-secondary education.

This study adopted the previous study's survey questionnaire. Most survey questions required respondents to rate several water resource management and environmental issues on a scale of 0 to 10. As in 1994, respondents ranked reducing river and lake pollution (mean rating of 9.3 out of 10) and reducing atmospheric pollution (mean rating of 8.9 out of 10) as the two most important environmental actions. There were no significant changes since the previous study in the level of importance placed on these actions. Other actions that received higher than average ratings were wildlife habitat protection (8.7), fish habitat protection (8.5), re-forestation (8.4), old growth protection (8.4), and wetland preservation (8.2). The last two items were not listed among the top ranked actions in 1994. Creating water-related tourism development (5.6) was regarded as respondents' least important action.

On average, respondents rated the River Basin's water quality at 6.7 out of 10. This satisfaction with water quality was higher than the 1994 average rating (5.8). Overall, one-third of respondents gave high ratings (i.e. a rating of between 8 and 10) to the way that Basin water resources were being managed, compared with only one-quarter who held this view in 1994. On average, Manitobans (mean rating of 5.6) were the least satisfied, and respondents from Saskatchewan (mean rating of 6.3) the most satisfied with water resource management. About 60% of respondents thought that changes in current local water management processes were necessary. The most important cited change was provision of better sewage systems to minimize water pollution.

Provincial and municipal governments (42%) were still identified as the main players in the overall management of water resources across the River Basin, followed by hydro and water companies (14%). Roughly one-third of respondents said that they did not know who was in charge of local water management.

An overwhelming majority of respondents (95%) attached great importance (i.e. a rating of between 5 and 10) to the need for public involvement in the water management process. Forty-six percent deemed it an extremely important issue (i.e. a rating of 10 out of 10). Despite this, most (76%) indicated that it was less likely that they would be personally involved in the public water management process in the future. This ambivalence to participate in future public water management was borne from past experience with environmental issues. A greater proportion of respondents (89%) said that they had never been personally involved in determining how water should be managed. Additionally, most (85%) were not involved in any group or organization that dealt with environmental issues. These findings were similar to the 1994 results.

On average, respondents' three most important concerns regarding water management issues, in order of importance, were: pollution from cities and towns (8.6/10), industrial pollution (8.5/10), and loss of fish habitat (8.2/10). Respondents were less concerned about irrigation from rivers and lakes (6.7/10), heritage resource loss (6.4/10), and recreational development along riverbanks and lakes (6.1/10). The most and least important water management concerns—city and town pollution and recreational development, respectively—were the same in this survey as in 1994.

A vast majority of respondents (87%) said that they were less informed about local water management issues. Only 13% said that they were well informed (i.e. a rating of between 8 and 10) about such management issues. These findings were similar to those obtained in 1994 (84% less informed, 16% well informed).

Nevertheless, most respondents (75%) said that they were interested (i.e. a rating of between 5 and 10) in obtaining more information on water management issues. One-third of these indicated a rating of between 8 and 10 for this question. There appears to have been a decline in the interest level in water management issues, using the surrogate indicator of requests to receive more information. On a 0 to 10 scale, response to this question declined from 6.5 in 1994 to 5.8 in 2002/03. This may have reflected a growing disenchantment with the level of public involvement in water management processes over this period of time.

Between 1994 and 2002/03, there was no change in the perception of the most important methods (mass media, mail pamphlets, academic institutions) and least important method (open houses) of receiving water management information. These preferred methods were in keeping with methods that respondents used to obtain information on environmental issues in 2002/03. A small proportion of respondents (8%) used the internet, which was not mentioned in the 1994 study. There was a significant decline between the study periods in the proportion of respondents who utilized any of the sources of information provided in the survey.

As in 1994, rivers remained the main source of drinking water in most homes (51%) within the River Basin. A greater proportion of residents in Manitoba (67%) than

Alberta (47%) and Saskatchewan (41%) cited rivers as the primary source of their drinking water. Ground water (e.g. wells) was the second most important source of drinking water within the Basin, particularly in Saskatchewan (34%). A few respondents (7%) were unable to identify their source of drinking water. As might be expected, urban residents were more likely to cite rivers as their source of tap water, while residents in rural areas and small communities were more likely to use ground water.

About two-thirds of respondents had water meters in their homes. Homes with water meters were linked to community size (i.e. the larger the community, the more likely it is to have meters). Because the Alberta region of the Basin has more urban centres than the other provinces (Manitoba has the fewest urban centres), the number of homes with water meters ranged from 69% (Alberta) to 59% (Manitoba). This pattern was also noted in the1994 study.

The two most common water conservation devices used in homes across the Basin were toilet water regulator devices (50%) and shower restrictors (49%). Few homes in the Basin used tap restrictors (27%). Urban residents were more likely to use all of these devices than counterparts in smaller communities and rural areas.

In both 1994 and 2002/03, it was noted that the three most common activities along riverbanks and lakes in a typical summer were walking or cycling (81%), camping or going to a cottage (65%), and swimming or wading (63%). Commercial fishing was the least undertaken activity along riverbanks and lakes in summer.

This study examined changes in residents' perceptions and attitudes towards water resources and the environment in the Saskatchewan River Basin between 1994 and 2002/03. It was noted that more similarities than differences emerged between the study periods. For example, despite greater visibility in the public media regarding water-related issues, there were no significant changes in public opinion regarding water and atmosphere pollution reduction, water quality improvement, and public involvement in the environmental management process. It is suggested that public education needs to be intensified to increase public participation in water resources and environmental management activities.

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Introduction

This study's main goal was to compare changes in residents' attitudes towards water resource management in the Saskatchewan River Basin from 1994 to 2002/03. The Saskatchewan River Basin embodies parts of Alberta, Saskatchewan, and Manitoba (see **Figure 1**). Water bodies, including rivers, lakes, and underground water, within the River Basin are utilized for several purposes: household use, industry, agriculture, hydroelectricity generation, and recreation. According to a 1994 Prairie Research Association Inc. study, people living in the River Basin had diverse opinions as to how water should be managed to enhance quality of life and be preserved for future generations' use. Considering that humans are dynamic and their attitudes and perceptions change with time, the Partners for the Saskatchewan River Basin (PFSRB) felt it important to undertake another study to discern whether opinions and attitudes of River Basin residents towards water resource management and the environment had changed over the more than eight-year span.

In the last few years, the issue of water and water quality has been a topic of media study, usually with negative connotations, such as cryptosporidium, boil water orders, drought, and water diversion. The challenges of addressing these and other issues will only increase. It is only with proper understanding about watersheds, the important relationship between riparian areas and water bodies, and how water quality can be impacted that we can make appropriate decisions about water resource management and protection.

Research Objectives

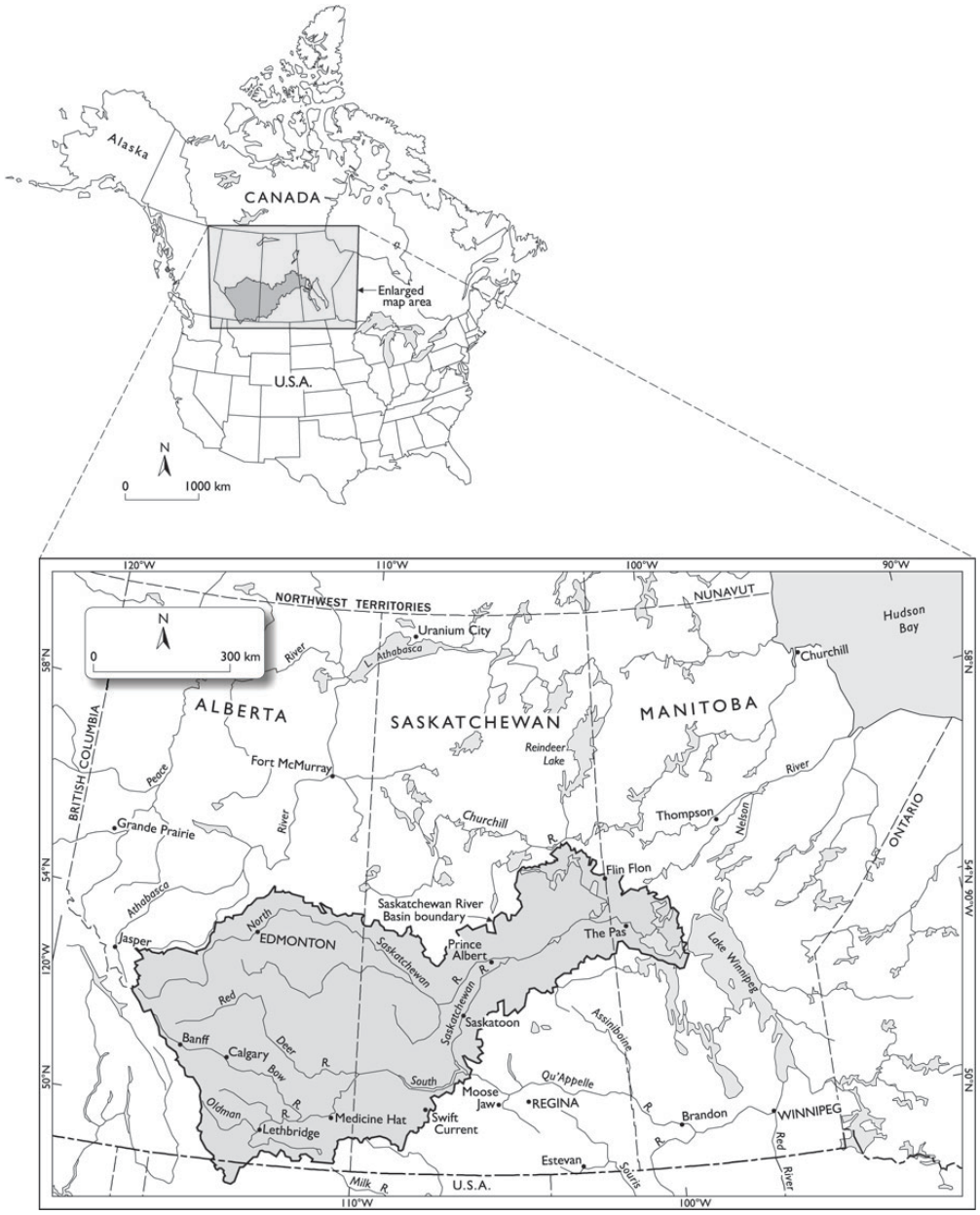
This study's primary focus was to provide information on public attitudes, knowledge, and views about water resource management, environmental concerns, and needs. It sought to identify changes in people's attitudes and perception toward water resource utilization and management within the Saskatchewan River Basin since the 1994 investigation. (See **Appendix B** for the 1994 study's ExecutiveSummary).

Research Methodology

Initially, this study's targeted sample size was 550 River Basin residents, comparable to the 1994 study. Unfortunately, lack of time and resources dictated that only 267 residents were surveyed (**Table 1**).

A list of residential telephone numbers for Alberta, Saskatchewan, and Manitoba was obtained from ASDE Survey Sampler Inc., a survey research-consulting agency in Quebec. A computer-based program was used to generate a random sample of residential

Figure 1. Map of the Saskatchewan River Basin



telephone numbers using all prefixes (i.e. first three digits of phone numbers) available within the River Basin's boundaries (see **Figure 1**). In other words, all telephone prefixes used within the River Basin at the time of the survey had a chance to be selected. The sample was stratified to correspond with the proportion of the population within the Basin from each province (see **Table 1**). The telephone data included names of communities, postal codes, and Statistics Canada classification of communities (e.g. urban, rural, fringe) based on population size and postal codes.

Table 1. Distribution of Sample by Province

Province	2002/03		1994	
	Frequency	**Percent**	**Frequency**	**Percent**
Alberta	116	43.4%	250	45.3%
Saskatchewan	76	28.5%	150	27.3%
Manitoba	75	28.1%	150	27.3%
Total	267	100%	550	100%

Four research assistants conducted a telephone survey using randomly sampled residential telephone numbers. All Basin residents 18 years and older and having a telephone had an equal chance of being interviewed. In order to assist in the comparison, the survey questionnaire (see **Appendix A**) was similar to that used in 1994, with slight modifications. In particular, a number of questions were omitted from the previous questionnaire after consultation with the PFSRB. Telephone interviews were conducted between August 2002 and February 2003, between 9 a.m. and 11 p.m., Monday through Sunday.

Using the Statistical Package for the Social Sciences (SPSS), descriptive statistical techniques (e.g. frequencies, means, ranges, percentages, cross tabulations), the Mann-Whitney U-test, independent sample test, regression, and correlation were employed to analyze the data. Open-ended response analysis focused on three topics: (1) changes that respondents would like to see in the way that water resources were managed; (2) respondent awareness of agencies responsible for managing water resources; and (3) where residents would go first to obtain information on water-related issues. Responses were classified thematically to identify the most and least dominant subjects (e.g. major changes expected in water management and their primary sources of water-related information).

As **Appendix A** demonstrates, most survey questions required respondents to rate their attitudes towards questions related to water resource management and the environment using an eleven-point scale from zero to ten, where zero represented the lowest rank on the scale (e.g. not at all important) and ten the highest rank on the scale (e.g. extremely important). Once again, although there may be some concerns regarding methodologies followed in this survey, the objective of comparing across time took precedence over such issues.

Survey interpretation is discussed below in seven sections, once again corresponding to the 1994 study. These are: (1) action on environmental issues; (2) water resource management; (3) water management information; (4) public involvement in resource management issues; (5) home water uses; (6) recreational water uses; and (7) differences between and/or among demographic characteristics (e.g. gender, age, educational status). An additional section at the end of this report provides a summary and conclusions.

Opinions on Environmental Actions

The 267 residents surveyed across the River Basin were asked to rate the importance of nine environmental actions on a scale of 0 to 10, where 0 was not at all important and 10 extremely important.[1] **Table 2** demonstrates that all the environmental actions had mean scores above 5.0, suggesting that they had some importance to Basin residents, although some were more important than others. Overall, only two environmental actions (protected areas and tourism development) had an average rating below 8.0, compared to four actions with this rating in 1994 (**Table 2**). This shift was due to growing significant interest that Basin residents showed in preservation of old growth forest (8.4) and wetlands (8.2).

Almost all respondents (92%) thought that reducing pollution in rivers and lakes (mean rating of 9.3) was the most important environmental action. Their second most important concern was a need to reduce atmospheric pollution (mean rating of 8.9). Creating water-related tourism development (mean rating of 5.6) was regarded as the least important of the environmental actions. These findings were remarkably similar to the 1994 results (see **Table 2**). Reforestation had fallen to the fifth important issue by the time of the 2002/03 survey (8.4).

Table 2 also suggests that Basin residents across all three provinces held similar opinions on the level and ranking of importance of all environmental actions. The similarity in these actions' ranking is probably due to similar geographic settings, natural resource endowment, economic bases, and water uses in these provinces. Rivers and lakes within the River Basin are the major water sources for many homes and agricultural, hydro, and industrial activities. Considering that these economic activities generate

various pollutants and are located near most communities across the Basin, one might expect residents to share similar concerns about the activities' impact on water and the environment in general.

Table 2. Comparison of Mean Ranking of Importance of Environmental Actions, 1994 and 2002/03
(Rating: 0 = Not At All Important, 10 = Extremely Important)

Environmental Action	Total		Alberta		Saskatchewan		Manitoba	
	Mean 2002/3 (n = 254)	Mean 1994	**Mean 2002/3 (n = 110)**	Mean 1994	**Mean 2002/3 (n = 70)**	Mean 1994	**Mean 2002/3 (n = 74)**	Mean 1994
Reducing Pollution of Waters	**9.3**	9.3	**9.1**	9.3	**9.3**	9.3	**9.6** [b,c]	9.5
Reducing Pollution of the Atmosphere	**8.9**	9.0	**8.9**	9.1	**9.0**	8.9	**9.0**	9.3 [c]
Protecting Wildlife Habitats	**8.7**	8.7	**8.4**	8.8	**8.8**	8.6	**8.9** [b]	9.0
Protecting Fish Habitants	**8.5**	8.4	**8.2**	8.3	**8.5**	8.4	**9.0** [b]	8.8 [b,c]
Re-forestation	**8.4**	8.8	**8.1**	8.9	**8.5**	8.7	**8.7** [b]	8.8
Preservation of Old Growth Forest	**8.4**	7.7	**7.4**	7.7	**7.9**	7.2 [a]	**7.2**	7.8 [c]
Wetland Preservation	**8.2**	7.7	**8.3**	7.8	**8.3**	7.6	**7.9**	7.5
Creating More Protected Areas	**7.5**	7.5	**7.3**	7.6	**7.6**	7.4	**7.7**	7.7
Creating Water-Related Tourism Dev.	**5.6**	5.8	**5.2**	5.6	**6.6** [a,c]	6.3 [a]	**5.2**	7.0 [b,c]

Significant Differences ($p < 0.05$; Method Used: Mann-Whitney U Test) between:
[a] Alberta and Saskatchewan [b] Alberta and Manitoba [c] Saskatchewan and Manitoba

Although a primary concern for all Basin residents, those in Manitoba were statistically more concerned than others about river and lake pollution reduction. It may be that Manitoba residents' relative location—downstream of most other Saskatchewan River Basin users and therefore subject to upstream users' activities and possible pollutants—may have accounted for this greater level of concern. Those in Manitoba and Alberta differed significantly in their ranking of the importance of fish and wildlife habitat protection and reforestation concerns. Manitobans may have been more concerned about these issues than Albertans because their portion of the watershed is predominantly forest compared to the predominant prairie in Alberta's watershed region. Saskatchewan respondents were more concerned about water-related tourism development than those in the other two provinces.

Water Resource Management

The 1994 study defined water resource management as "regulation of access, quality and quantity of water."[2] This definition raises several issues, such as water resource management responsibility, why it should be regulated, and the opinions of those utilizing this resource. A bottom-up or grassroots approach was adopted to address these questions. Basin residents were asked to express opinions on several water resource management issues including level of satisfaction with water resource management, local water quality, changes needed in water resource management, agencies responsible for managing water resources, and need for public consultation about local water management issues.

Satisfaction with Water Resource Management

Respondents were asked to rate their satisfaction with local water management.[3] **Figure 2a** shows that about one-third of the Basin respondents gave a high rating (i.e. between 8.0 and 10.0) to the way water is locally managed.

While the overall average satisfaction rating remained the same as in 1994 (approximately 6.0), the proportion of respondents who rated water management between 8 and 10 increased from 24% to 34%. This suggests that Basin residents had more extreme attitudes in their satisfaction level regarding local water management in 2002/03 than they did almost a decade previous. As in the 1994 study, a greater proportion of Manitoba respondents than those in Saskatchewan and Alberta registered satisfaction (between 8.0 and 10.0) with local water management (**Figure 2a**). It would have been interesting to explore the reasons for differences among the provinces, but respondents were not asked to comment on their ratings.

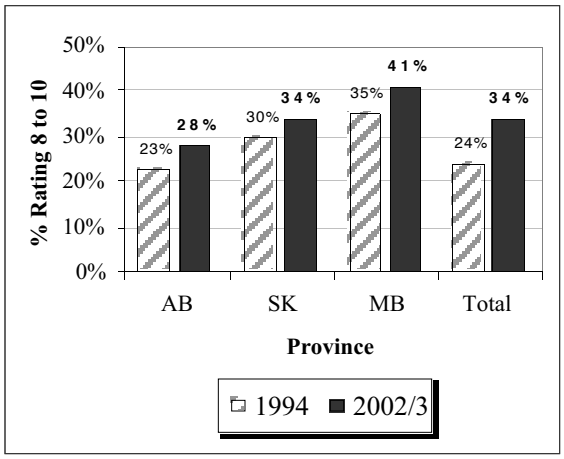
A majority of Basin residents (58%) thought that changes in water resource management techniques were necessary.[4] They suggested several changes, including water pollution reduction, better sewage systems, better water conservation practices, hydro and industrial activity regulation, stricter environmental laws and penalties, greater public education, consultation, and further research on water management and environment-related issues (**Table 3**). As in 1994, the most significant change voiced by respondents (26%) was that there should be better pollution control or sewage systems. In more detailed answers, these included pollutants from mines, dams, and industries, farm runoff, and waste from homes, all of which affected public drinking water. Roughly one tenth (11%) of respondents were content with their present water management system.

Responsibility for Water Resource Management

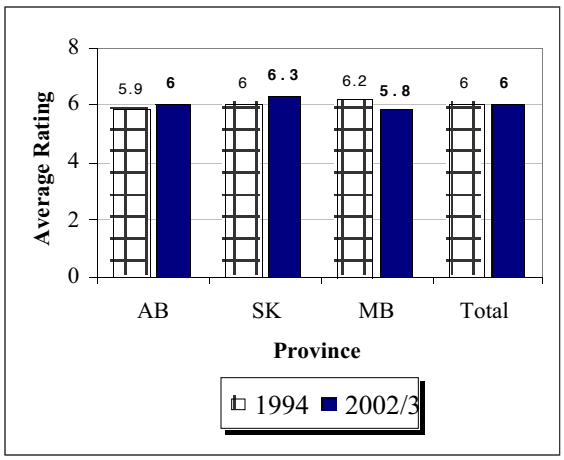
It was perceived that River Basin water resource management was conducted on a top-down basis (i.e. largely government controlled), as **Table 4** suggests.[5] The public's role in water resource management was not mentioned, which narrowed the definition of water resource management to some extent. Most respondents indicated that provincial

Figure 2. Comparison of Satisfaction with Water Management Resources, 1994 and 2002/03 (Rating: 0 = not at all satisfied, 10 = completely satisfied)

(a)



(b)



and municipal governments (21% each) were the principal agents responsible for overall River Basin water resource management (**Table 4**). Basin residents' knowledge on this subject had not changed since the 1994 study. Specific provincial departments such as Natural Resources, Conservation, Environment and Resource Management were cited as being in charge of managing Basin water resources. A majority of respondents in Alberta and Manitoba attributed water resource management duties to, first, provincial governments and, second, municipal governments. In Saskatchewan, the municipal government was most often identified as the main agent in charge of water management. This implies that Saskatchewan residents identified less strongly with their provincial government as the institution responsible for water resource management than those in Alberta or Manitoba.

Table 3. Comparison of Suggested Changes to Water Resource Management, 1994 and 2002/03

Suggested Change(s)	Total		Alberta		Saskatchewan		Manitoba	
	2002/03 (n = 302) %	1994 %	**2002/03 (n = 134) %**	1994 %	**2002/03 (n = 80) %**	1994 %	**2002/03 (n = 88) %**	1994 %
Pollution Control/Better Sewage System	**26**	38	**25**	37	**18**	41	**35**	34
Water Conservation (e.g. less waste, meters, export)	**9**	7	**9**	8	**14**	5	**3**	4
Less/regulate Hydro & Industrial Activities	**6**	-	**4**	-	**4**	-	**10**	-
Preservation of Environment (wildlife, less access, etc.)	**4**	6	**3**	7	**4**	4	**5**	5
Stricter Environmental Laws & Penalties	**3**	-	**6**	-	**-**	-	**2**	-
Public Education/Consultation/Access to Information/Research	**5**	1	**6**	1	**4**	-	**4**	<1
Less Regulation on Use of Water	**3**	-	**2**	-	**3**	-	**3**	-
More Resources for Water Management (funds, humans, etc.)	**1**	-	**1**	-	**1**	-	**1**	-
Reduce Management Expenses (e.g. too many departments, etc.)	**1**	-	**-**	-	**3**	-	**1**	-
Less Fishing/Maintain Fish Stocks	**1**	<1	**-**	-	**1**	1	**1**	3
Other	**<1**	4	**1**	4	**-**	5	**-**	6
No Changes Necessary	**11**	18	**8**	18	**13**	17	**14**	25
Do Not Know/No Response	**31**	21	**34**	21	**38**	18	**19**	17
Total	**100**	100	**100**	100	**100**	100	**100**	100

Another identified set of key agents, especially in Manitoba (27%), were hydro and water companies (14%), such as Manitoba Hydro, SaskWater, SaskPower, and EPCOR. Hydro and water companies were perceived to play a minor role in water resource management in Alberta. These companies' influence on River Basin water resource management and environmental policies needs further investigation. Finally, roughly one-third of respondents were unaware of who was responsible for local water resource management. This lack of awareness or unwillingness to guess was especially

high in Saskatchewan (42%). This suggests a need for greater public education and consultation on such matters.

Table 4. Agent Responsible for Water Resource Management, 1994 and 2002/03

Agent Responsible	Total		Alberta		Saskatchewan		Manitoba	
	2002/03 (n = 286) %	1994 %	**2002/03 (n = 124) %**	1994 %	**2002/03 (n = 79) %**	1994 %	**2002/03 (n = 83) %**	1994 %
Provincial Government/Specific Department	**21**	28	**26**	29	**9**	21	**24**	25
Municipal Government (City, Town, RM)	**21**	28	**23**	29	**22**	24	**18**	20
Hydro & Water Companies	**14**	<1	**6**	-	**14**	1	**27**	10
Government/Departments	**5**	-	**6**	-	**6**	-	**4**	-
Federal Government/Specific Department	**3**	3	**2**	4	**3**	1	**5**	1
Boards (water, parks, etc.)	**1**	1	**2**	1	**3**	3	**-**	-
Several Agencies were Cited	**1**	-	**3**	-	**-**	--	**-**	-
Other	**1**	4	**-**	3	**3**	9	**1**	9
Do Not Know/No Response	**32**	29	**32**	28	**42**	31	**22**	35
Total	**100**	100	**100**	100	**100**	100	**100**	100

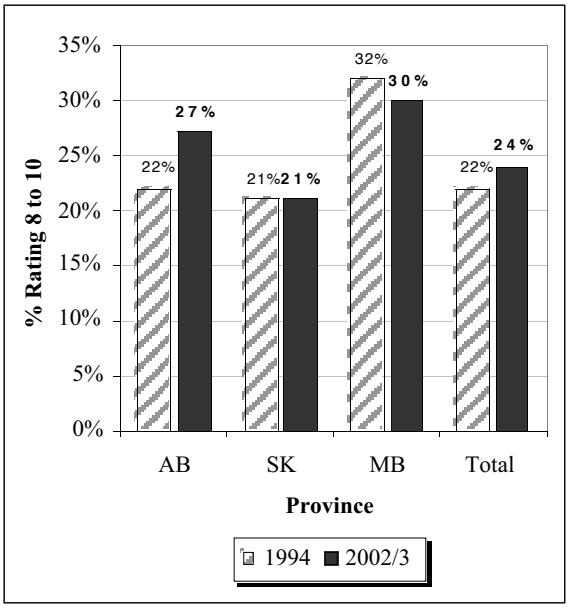
Public Involvement in Water Resource Management

Greater public consultation and access to information was one suggested change for water resource management (**Table 3**). Over 90% of respondents gave a rating of between 5 and 10 regarding public involvement in water resource management.[6] **Table 5** shows that close to half of Basin residents indicated that public involvement in water management was extremely important (rating of 10 out of 10). The high average rating (about 8.0) for each province reinforces the significance of a need for this kind of public input. These results suggest that the definition of responsibility for water resource management should be broadened to include the public at large in addition to those institutions at the top of the administrative hierarchy, such as provincial and municipal governments.

The proportion of Manitoba respondents who thought that public input in water management was extremely important decreased significantly, from 56% in 1994 to 30% in 2002/03. This contrasts with Alberta, where there was an increase in the proportion of respondents who felt that public input was extremely important, from 39% in 1994 to 57% in 2002/03 (**Table 5**). Ironically, while Basin residents as a whole believed strongly in a need for public input in water resource management (mean rating of 7.9), they were less likely to be personally involved in this public process (mean rating of 4.3).[7] Overall, only 24% of respondents gave a rating of between 8.0 and 10.0 in response to a question regarding the likelihood of them becoming involved in a public water resource management process (**Figure 3**). An overall mean rating of 4.3 (**Figure 3b**) suggests that residents across the entire River Basin were less likely to be involved in a public

Figure 3. Likelihood of Becoming Involved in a Public Process of Water Management, 1994 and 2002/03 (Rating: 0 = Definitely Would Not, 10 = Definitely Would)

(a)



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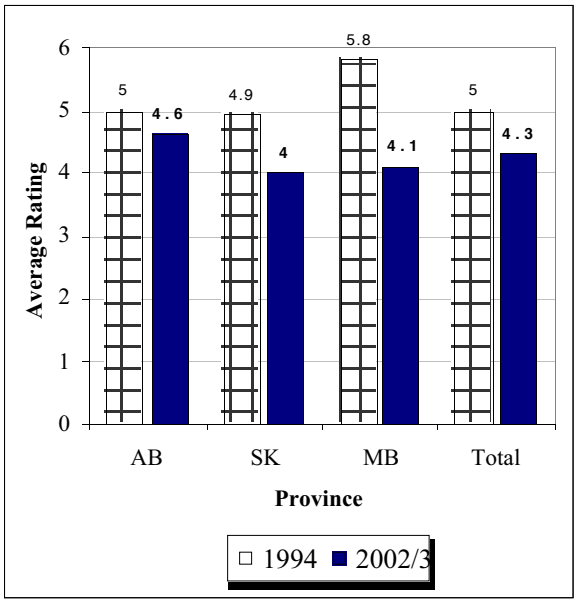


water management process. **Figure 3b** shows that mean ratings of a likelihood of public involvement in water management across all three provinces decreased, with the greatest relative decline occurring in Manitoba (5.8 to 4.1).

Table 5. Importance of Public Input in Water Resource Management, 1994 and 2002/03
(Rating: 0 = Not At All Important, 10 = Extremely Important)

Province	Rating			
	Average Rating		% Extremely Important (Rating of 10)	
	2002/03	1994	2002/03	1994
Alberta (2002: n = 109)	7.8	8.4	57%	39%
Saskatchewan (2002: n = 72)	7.9	8.6	47%	43%
Manitoba (2002: n = 71)	8.1 [b]	9.1 [b,c]	30%	56%
Total (2002: N = 252)	7.9	8.4	46%	40%

Significant Differences ($p < 0.05$; Method Used: Mann-Whitney U Test) between:
[a] Alberta and Saskatchewan [b] Alberta and Manitoba [c] Saskatchewan and Manitoba

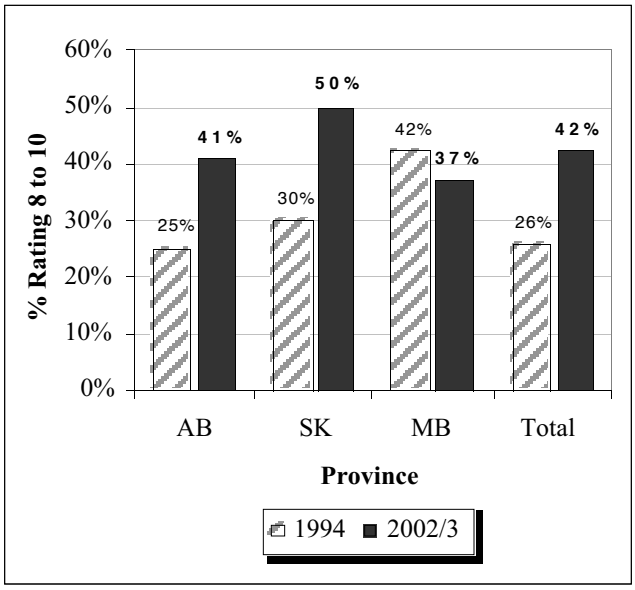
Perception of Water Quality

Figure 4 shows wide provincial differences in public perception about River Basin water quality.[8] It also shows that while perception of water quality has improved significantly overall, it was not consistent across the three provinces. Almost half (46%) of survey respondents rated local water quality in rivers and lakes between 5 and 7, and the overall average rating across the Basin increased from 5.8 in 1994 to 6.7 in the most recent survey. This suggests that, although many residents still had significant concerns regarding their water quality, attitudes became more positive. **Figure 4b** shows a positive shift in attitudes between 1994 and 2002/03 in the mean rating of water quality in both Alberta and Saskatchewan, but virtually no change in Manitoba.

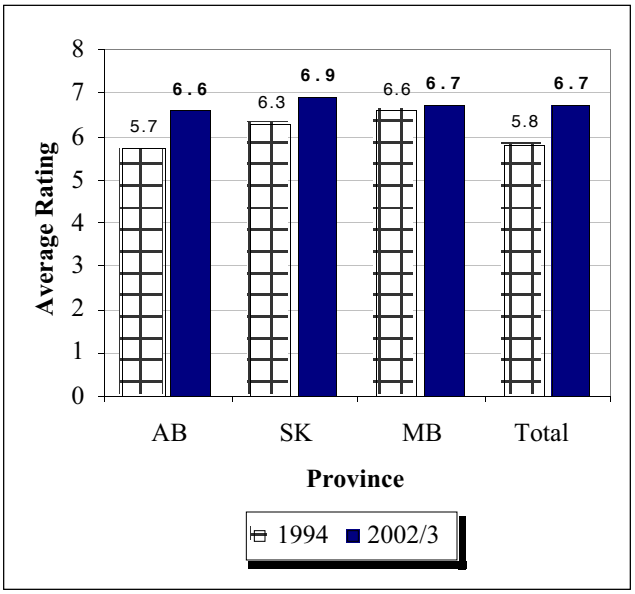
A strong significant positive relationship ($r = 0.363$, $p < 0.01$) exists between water quality and satisfaction with water resource management, meaning that those who gave a high ranking for water quality were significantly more satisfied with local water resource management. For example, Saskatchewan respondents were both the most satisfied with water management (**Figure 2b**), and had the highest average rating for water quality perception (**Figure 4b**).

Figure 4. Perception of Quality of Water in Rivers and Lakes, 1994 and 2002/03 (Rating: 0 = Terrible, 10 = Excellent)

(a)



(b)



These findings suggest that water quality perception was still moderate and that many respondents were not completely satisfied with local water management. This raises concerns for domestic and recreational water utilization. Respondents were also concerned with water management problems, such as contamination of lakes, rivers, and ground water and loss of fish habitats due to industrial, recreational, forestry, and agricultural practices.

Concern about Water Management Issues

Survey participants were asked to rate their concerns regarding eleven water management issues.[9] **Table 6** shows that all the eleven items were perceived to be of considerable public concern. As in 1994, the average ratings given to these issues ranged from between 6 and 9 on a scale of 0 to 10.

Table 6. Comparison of Mean Ranking of Concern about Water Management Issues, 1994 and 2002/03
(Rating: 0 = Not a Concern at All, 10 = Of Great Concern)

Type of Concern	Total		Alberta		Saskatchewan		Manitoba	
	Mean 2002/03 (n = 253)	Mean 1994	**Mean 2002/03 n = 110)**	Mean 1994	**Mean 2002/03 (n = 70)**	Mean 1994	**Mean 2002/03 (n = 73)**	Mean 1994
Pollution from Cities & Towns	**8.58**	8.5	**8.55**	8.5	**8.59**	8.2	**8.63**	8.2
Pollution from Industries	**8.51**	9.0	**8.35**	9.1	**8.27**	8.7	**8.99** [b,c]	8.6 [b]
Loss of Fish Habitat	**8.16**	8.2	**8.11**	8.2	**8.04**	7.7 [a]	**8.35**	8.6 [b,c]
Loss of Wetland & Riverbank Habitat	**7.98**	7.8	**8.07**	7.9	**7.90**	7.5 [a]	**7.90**	7.4 [b]
Protecting Ground Water	**7.84**	8.6	**7.87**	8.6	**7.81**	8.6	**7.81**	8.5
Forestry Practices	**7.75**	8.0	**7.82**	8.0	**7.53**	7.8	**7.84**	8.1
Agricultural Practices	**7.67**	7.5	**7.88** [b]	7.5	**8.03** [c]	7.6	**7.01**	6.9 [b,c]
Amount of Water Used in Homes	**7.52**	6.7	**7.60** [b]	6.8	**8.03** [c]	6.5	**6.89**	6.8
Rivers & Lakes Water for Irrigation	**6.70**	6.6	**6.95**	6.7	**6.51**	6.1 [a]	**6.50**	6.5
Loss of Heritage Resources	**6.53**	6.7	**6.22**	6.8	**6.29**	6.1 [a]	**7.22** [b,c]	7.1 [c]
Recreational Development	**6.11**	5.8	**5.95**	5.9	**6.56**	5.4	**5.93**	5.6

Significant Differences ($p < 0.05$; Method Used: Mann-Whitney U Test) between:
[a] Alberta and Saskatchewan [b] Alberta and Manitoba [c] Saskatchewan and Manitoba

Pollution from cities and towns, pollution from industries, and loss of fish habitat were the three most important concerns for respondents in all three provinces (**Table 6**). These issues were also among the top four water management concerns in 1994. According to the 2002/03 survey, 81% of respondents rated pollution from cities and towns between 8 and 10. Seventy-four percent assigned the same range of ratings to environmental pollution by industries. These concerns complemented the high level of importance that Basin residents placed on environmental actions (**Table 2**), particularly regarding water and air pollution reduction, and fish and wildlife habitat protection.

Differences between Alberta and Saskatchewan regarding average concern ratings about water management issues were insignificant, suggesting that respondents in these provinces shared similar views on these matters. However, there were significant differences between the two provinces and Manitoba regarding to agricultural practices and amount of water used in homes. More specifically, Manitoba respondents were less concerned about these particular environmental issues than their counterparts in Alberta and Saskatchewan. The 1994 study noted that, given the more northern latitude of the Saskatchewan River watershed as it passes through Manitoba, agriculture was not as significant an activity. This might have partly explained the relative lack of concern for agricultural practices expressed by Manitoba respondents compared to those in the rest of the Basin. However, Manitoba respondents were significantly more concerned about pollution from industries and loss of heritage resources than those in Alberta and Saskatchewan. The significant concern about these issues in Manitoba might be explained by the presence of mining companies and hydroelectric generating stations in this region of the Basin. For example, Manitoba Hydro's activities featured prominently in this area.

Water Management and Environmental Information

This study assessed respondents' current level of knowledge about water management issues while probing them about specific sources of water management and environmental information and their interest in obtaining more such information. Respondents were also asked to state what they felt to be the best means of disseminating information related to local water management and the environment.

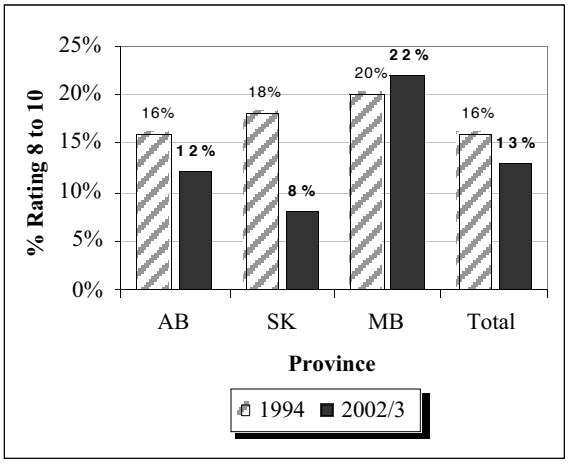
Perceived Knowledge about Water Management Issues

The results described above suggest that respondents to the 2002/03 survey were at least as concerned, and sometimes even more so, about local water management issues than they were in 1994. Nevertheless, **Figure 5** suggests that they also believed that they were less informed about these issues.[10] For all three provinces, and therefore for the region as a whole, respondents believed that they had less knowledge about water management issues in 2002/03 than in 1994 (**Figure 5b**). As in 1994, only a small

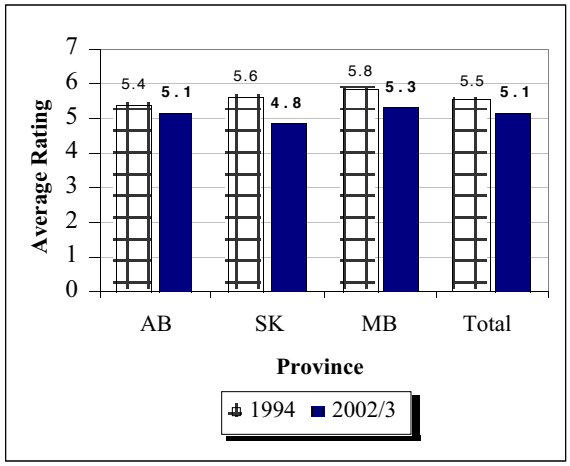
percentage of respondents (13%) gave a high rating (between 8 and 10) for their knowledge about water management issues, suggesting that, relative to other issues, individuals felt less comfortable about their knowledge of water management (**Figure 5a**). This problem may have been related to a lack of public involvement in environmental management processes and a lack of access to information on water and environmental management issues. It may also explain why respondents placed such a high level of importance on involving the public in the water management process (**Table 5**).

Figure 5. Comparison of Perceived Level of Knowledge about Water Management Issues, 1994 and 2002/03
(Rating: 0 = Not at All Informed, 10 = Very Well Informed)

(a)



(b)



In spite of their perceived limited knowledge about water management issues, approximately 90% of respondents knew where to obtain such information (**Table 7**).[11] In keeping with the 1994 study, respondents were most likely to contact a municipal government office (26%) or provincial government department (16%) than any other source for information on water management. Not surprisingly, it should be recalled that municipal and provincial governments were perceived as the principal agents responsible for local water management (**Table 4**) within the River Basin.

Table 7. First Source for Information on Water-Related Issues, 1994 and 2002/03

Source of Information	Total		Alberta		Saskatchewan		Manitoba	
	2002/03 (n=301) %	1994 %	**2002/03 (n=133) %**	1994 %	**2002/03 (n=82) %**	1994 %	**2002/03 (n=86) %**	1994 %
Municipal Office (City, Town, RM)	**26**	34	**27**	34	**29**	35	**22**	24
Provincial Government Department	**16**	25	**14**	27	**9**	15	**24**	44
Internet/Website	**11**	-	**19**	-	**4**	-	**7**	-
Hydro & Water Companies	**7**	-	**2**	-	**7**	-	**13**	-
Government/Departments	**6**	-	**7**	-	**9**	-	**3**	-
Federal Government Department	**5**	1	**3**	1	**2**	1	**9**	2
Representative/Official of an Agency	**2**	2	**1**	-	**5**	12	**2**	-
Workplace	**2**	-	**2**	-	**1**	-	**3**	-
MLA	**2**	-	**2**	-	**4**	-	**1**	-
NGOs	**2**	9	**1**	10	**5**	2	**1**	6
University/School	**2**	3	**1**	2	**5**	4	**-**	1
Library	**2**	4	**2**	4	**2**	4	**-**	<1
Friends & Relatives	**2**	-	**2**	-	**-**	-	**5**	-
Several Sources	**2**	-	**3**	-	**2**	-	**-**	-
Telephone Directory	**2**	-	**4**	-	**-**	-	**-**	-
Media (TV, Radio, Newspapers)	**1**	-	**2**	-	**-**	-	**-**	-
Water Boards	**-**	2	**-**	1	**-**	4	**-**	-
Other	**-**	8	**-**	8	**-**	9	**-**	9
Do Not Know/No Response	**11**	13	**10**	13	**16**	14	**8**	14
Total	**100**	100	**100**	100	**100**	100	**100**	100

Although there was a consistent decline in the proportion of respondents who felt that their first source of information on water management issues came from any of the government or institutional actors, this relative decline was almost wholly attributable to a rise in significance of the internet's role since 1994. It was not listed by anyone as a first source of information in 1994, but was a choice for fully 11% of respondents in 2002/03, ranging from a high of 19% in more urbanized Alberta to a low of 4% in Saskatchewan, the least urbanized region of the Basin.

Interest in Additional Information on Water Management

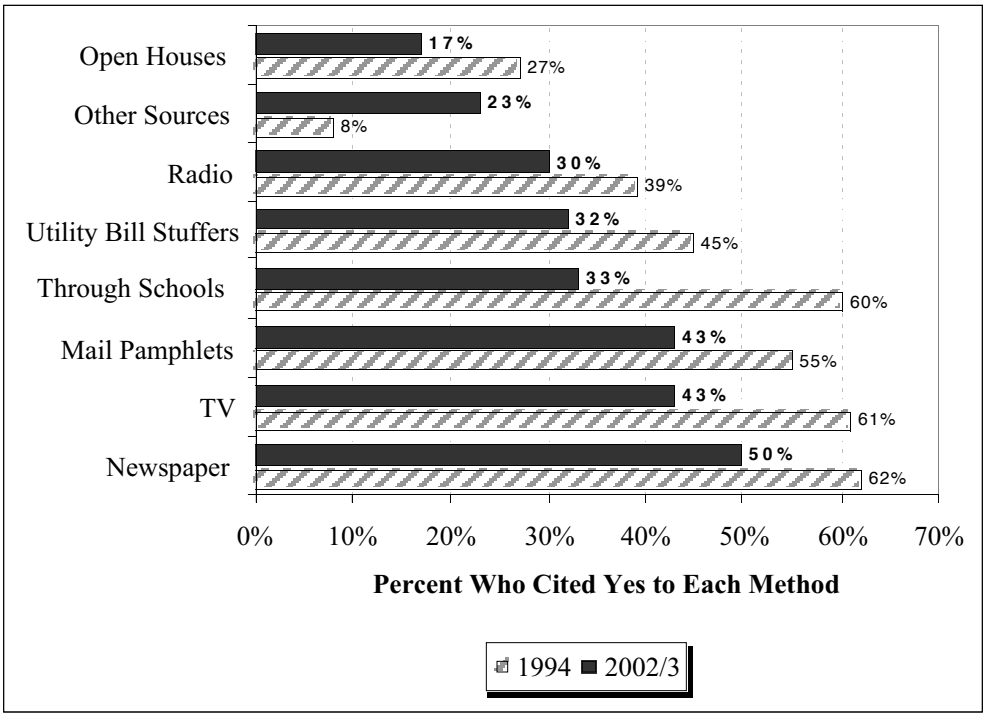
A majority of participants (75%) said that they were interested in obtaining additional information on water management issues (**Table 8**).[12] One-third of residents gave a high rating (between 8 and 10) when asked about their level of interest in receiving additional information. This interest in water management information indicated respondents' willingness to be informed about this issue after acknowledging that they were presently not well informed (**Figure 5**). However, interest in receiving additional information waned between 1994 and 2002/03, as suggested both by the average rating (5.8, compared to 6.5 in 1994) and percentage in the 8 to 10 rating range (33%, compared to 41% in 1994). Unlike many other responses, this question elicited a high degree of variation across the three provinces, with a high of 6.4 in Saskatchewan and a low of 5.6 in Alberta.

Table 8. Interest in Additional Information on Water Management Issues, 1994 and 2002/03
(Rating: 0 = Not At All Interested, 10 = Extremely Interested)

Province	Rating				
	Average Rating		% Giving Rating of 8 to 10		% Giving Rating of 5 to10
	2002/03	1994	**2002/03**	1994	**2002/03**
Alberta (2002/03: n = 113)	**5.6**	6.4	**28%**	39%	**73%**
Saskatchewan (2002/03: n = 69)	**6.4**	6.7	**45%**	44%	**72%**
Manitoba (2002/03: n = 73)	**5.8**	7.3	**30%**	53%	**80%**
Total (2002/03: N = 255)	**5.8**	6.5	**33%**	41%	**75%**

Concerning means of receiving water management information, most said that they preferred to use the mass media, particularly newspapers (50%), television, and mail pamphlets (43% each), followed by academic institutions (33%) (**Figure 6**).[13] Open houses (17%) was the least preferred method of receiving information on water management issues. Between 1994 and 2002/03, there was no change in the rank order of the three most important means to receive water management information. Indeed, there were only two discernable changes in the intervening eight years. There was decreased significance of schools as a forum to receive such information, and increased significance of "other" sources (e.g. the internet) that, in relative terms, decreased the significance of every other listed source.

Figure 6. Perception of the Best Method for Respondents to Receive Information on Water Management Issues, 1994 and 2002/03

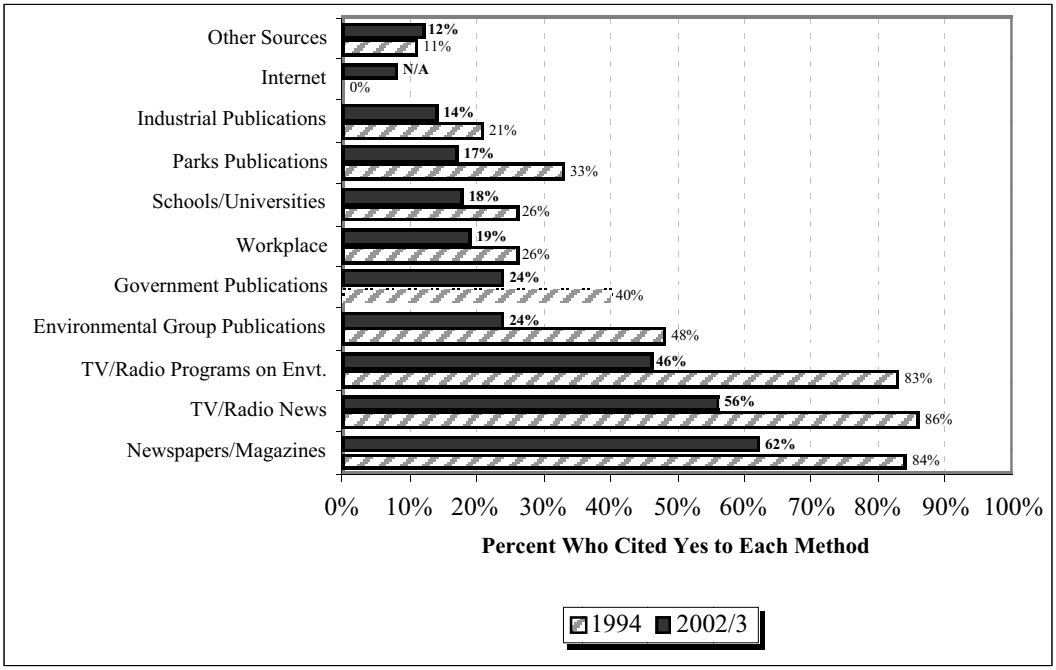


Method Used to Obtain Information on Environmental Issues

Respondents were asked about the methods used to obtain information on environmental issues in the year prior to the survey.[14] **Figure 7** shows that the mass media was the most common method that respondents used to obtain information on environmental issues. This was in agreement with their preferred means of receiving water management information (**Figure 6**).

More than half of respondents relied on newspapers or magazines (62%) and television or radio news (56%) for information on environmental issues. The next most important method used was television and radio programmes about the environment (46%). These three major methods of obtaining information were mostly the same as by respondents in the 1994 study, although television or radio news was the most important method in the previous study. In this study, less than a quarter of respondents used government publications, workplaces, academic institutions, or the internet to learn about the environment (**Figure 7**). As in 1994, few (12%) utilized "other sources" of information, such as municipal offices, PFRA office, workplace, family and friends, library, coffee shop, word of mouth, and personal observations.

Figure 7. Methods Respondents Used in the Year Prior to the Survey to Obtain Information on Environmental Issues, 1994 and 2002/03



Another striking difference between the 1994 and 2002/03 studies is the significant decline in the proportion of respondents who utilized various sources of information (**Figure 7**). The major decline was in respondents who utilized environmental groups' publications (decreased by 50%), television or radio programs (decreased by 45%), parks publications (decreased by 44%), and government publication (decreased by 40%). Those who used newspapers or magazines showed the least decline (decreased by 26%).

Newspapers or magazines were the most utilized method of information by respondents in Alberta (66%), Manitoba (61%), and Saskatchewan (57%). The next most important method was television or radio news (58% in Alberta, 57% in Saskatchewan, 52% in Manitoba). Manitoba residents (31%) utilized the workplace for environmental information more than those in Alberta and Saskatchewan (13% each). Albertans (25%) relied on academic institutions for information more than any other province. Regarding use of other sources, as noted in **Figure 7**, the differences between the provinces were insignificant.

Involvement in Resources Management and Environmental Groups

This section focuses on respondents' personal involvement in environmental management. In **Figure 3**, it was noted that a majority of respondents (76%) said that it was less likely that they would be personally engaged in a public water resources management process in the future. In keeping with this perception, only a small proportion of respondents (11%) said that they had ever been personally involved in a public water management process (**Table 9**).[15] The same figure was reported in the 1994 study. A small number of respondents (15%) also said that they were or had been members of a group or organization engaged in environmental issues.[16]

Table 9. Personal Involvement in Water/Environmental Management, 1994 and 2002/03

Type of Involvement	Total		Alberta		Saskatchewan		Manitoba	
	2002/03 (n=266)	1994	**2002/03 (n=116)**	1994	**2002/03 (n=76)**	1994	**2002/03 (n=74)**	1994
Personally involved in determining how water should be managed.	**11%**	11%	**9%**	10%	**12%**	15%	**14%**	6%
Member of a group or organization involved with environment.	**15%**	16%	**16%**	16%	**17%**	18%	**11%**	9%

There was a significant increase in the proportion of Manitoba respondents (14%, up from 6% in 1994) who indicated that they had been personally involved in water management issues. In 1994, Manitoba respondents were the least likely to be involved in such a public process compared to counterparts in the other provinces, but were more likely in 2002/03. Similar to the 1994 study results, Saskatchewan residents (17%) were slightly more likely to be members of an environmental organization than those elsewhere. Manitobans (11%) were least likely to be involved in an environmental organization.

The foregoing findings indicate that a majority of respondents were uninterested in being part of an environmental management process, considering that more than 80% had neither been personally involved in determining how water should be managed nor joined any environmental organization or group, and were unlikely to do so. This hesitance to participate in future public environmental management issues contradicted respondents' strong support for public involvement in such endeavours. Respondents were not asked to provide any explanation for their opinions on involvement in environmental management. Accordingly, it is difficult to speculate why many of them did not want to be involved in this matter. Future investigations should focus on exploring why these differences exist and how to balance contrasting attitudes of respondents toward environmental issues. Public education should also be reinforced along these lines.

Water in the Home

This study also probed respondents' knowledge of their drinking water's source and whether a water meter was installed in their homes. Additionally, they were surveyed about use of home water conservation devices.

Source of Drinking Water

As in 1994, rivers remained the most common source of home drinking water within the River Basin.[17] **Table 10** shows that more than half of respondents received their drinking water from rivers (51%). More respondents in Manitoba (67%) than Alberta (47%) and Saskatchewan (41%) said that rivers were the main source of their drinking water.

Table 10. Main Source of Drinking Water, 1994 and 2002/03

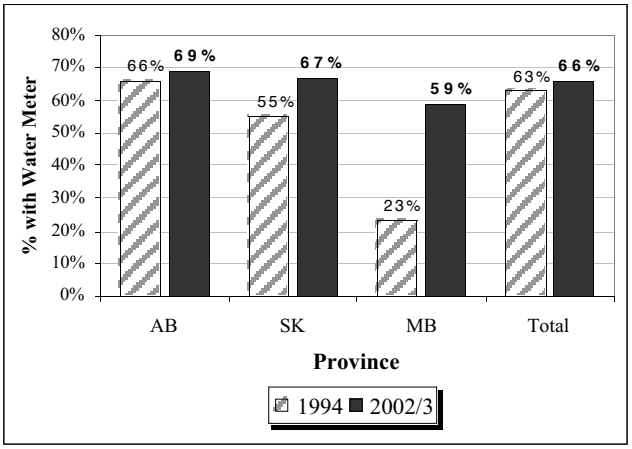
Source of Water	Total		Alberta		Saskatchewan		Manitoba	
	2002/03 (n=265) %	1994 %	**2002/03 (n=115) %**	1994 %	**2002/03 (n=75) %**	1994 %	**2002/03 (n=75) %**	1994 %
River	**51**	60	**47**	67	**41**	37	**67**	33
Ground Water	**25**	20	**23**	14	**34**	48	**22**	15
Bottled/Machine Water	**11**	-	**12**	-	**13**	-	**8**	-
City/Town Water System	**3**	-	**3**	-	**3**	-	**1**	-
Lake	**2**	4	**1**	4	**4**	5	**1**	42
Other Source	**1**	7	**1**	6	**1**	7	**-**	4
Do Not Know	**7**	9	**13**	10	**4**	4	**1**	6
Total	**100**	100	**100**	101	**100**	101	**100**	100

The 1994 study noted that Albertans were more likely to obtain drinking water from rivers than other Basin residents. In this study, groundwater was the second most cited source of River Basin drinking water. Similar to the 1994 study, more Saskatchewan respondents (34%) relied on groundwater than respondents in the other provinces. Eleven percent of respondents used bottled water or water machines. This figure was a significant increase from 2.7% in the 1994 study. This shift was perhaps due to growing concerns about water quality within the provinces and, generally, across Canada. Water from lakes accounted for the least used source of drinking water in the River Basin. A small number of respondents (7%) were unable to identify their drinking water's source. More of these people were located in Alberta (13%) than anywhere else (**Table 10**).

Variation in drinking water sources across the River Basin was strongly related to community size (i.e. urban or rural) in which respondents lived. Two-thirds of urban residents received their drinking water from rivers. However, 76% of rural and small town residents used groundwater for their drinking water. Fifty-three percent of those who used bottled water (n = 30) were urban residents, while the other 47% were rural and small town residents. Eighty percent of respondents in Alberta were urban residents compared to 55% in Saskatchewan. Accordingly, the former were more reliant on rivers for drinking water than the latter. Manitoba residents (96%) were mostly from small towns and obtained their drinking water mainly from rivers.

As in 1994, the proportion of homes with water meters[18] decreased from Alberta to Manitoba (**Figure 8**). This pattern mirrored the distribution of urban and rural communities across the River Basin. There were more urban centres within the Alberta region of the Basin than any other region. Manitoba had the fewest urban areas. Therefore, Alberta homes (69%) were more likely to have a water meter than homes elsewhere. Although Manitoba (59%) had the fewest number of homes with water meters, the proportion with water meters increased significantly, from 23% in 1994 to 59%. Similarly, homes in Saskatchewan that had water meters also increased from 55% in 1994 to 67% in 2002/03. Overall, homes with water meters in the River Basin increased slightly since 1994 (**Figure 8**).

Figure 8. Percentage of Households with Water Meters in Home, 1994 and 2002/03



WATER CONSERVATION DEVICES

In addition to having water meters in homes, River Basin residents used water conservation devices, namely shower restrictors, tap restrictors, and toilet water

regulators.[19] As in 1994 (**Figure 9b**), the two most common devices used within the River Basin were those for regulating toilet water (50%) and showers (49%). Tap restrictors (27%) were the least used water conservation devices in River Basin homes (**Figure 9a**). It is important to note that urban residents (roughly 57%) were more likely to use these water conservation devices than their counterparts in rural and small communities.

Figures 9a and **9b** show that homes in Alberta were more likely to have any of the three above devices than Saskatchewan and Manitoba homes. This was due to the predominance of urban residents in Alberta. More than 80% of Albertans who used these devices lived in urban settings. In Saskatchewan, more than half of homes using these water conservation devices were urban residences (approximately 53% each). Alberta homes were more likely to have a shower restrictor than toilet or tap water regulators. Manitoba and Saskatchewan homes were more likely to have low-flush toilets than any other water conservation device.

There was a significant positive relationship between homes with shower restrictors, tap restrictors, and low-flush toilets. This implies that homes using any of the water conservation devices were more likely to use other water conservation methods. Nevertheless, the relationship between having a water meter in the home and the likelihood of using a water conservation device was insignificant, meaning that homes that had water meters did not necessarily have a water conservation device.

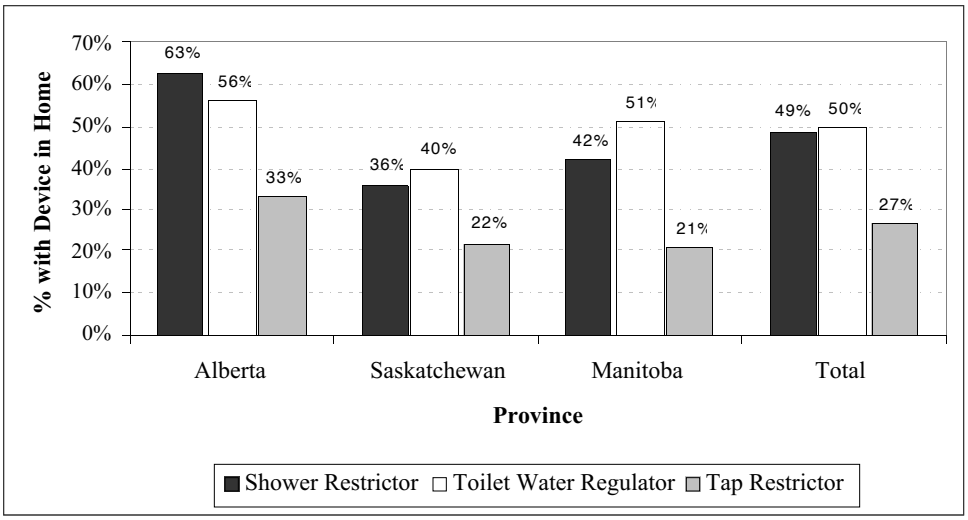
Recreational Uses of Rivers and Lakes

River Basin residents utilized rivers and lakes for numerous activities, particularly recreation, in a typical summer.[20] Walking or cycling by the shores of River Basin rivers or lakes was the most common recreational activity. **Table 11a** shows that 81% of Basin residents were involved in this kind of activity and, on average, they engaged in this activity 44 times in a typical summer. The second most common activity in a typical summer was camping or staying in a cottage by a river or lake (65%), followed by swimming or wading (63%). These recreational activities were identical to the most important activities noted in the 1994 study (**Table 11b**). Less than half of respondents were interested in other activities such as sport fishing, canoeing or rowing, power boating, or hunting.

There were significant differences between the provinces in terms of how frequently respondents participated in a recreational activity and the number interested. **Table 11a** shows that Manitoba respondents were more likely to engage in camping or going to a cottage, canoeing or rowing, sport fishing, and power boating in a typical summer than counterparts in Alberta and Saskatchewan. Walking or cycling and commercial finishing were also more frequent summer activities for Manitoba respondents than those in Saskatchewan. Swimming or wading was a recreational activity for more respondents

Figure 9. Percentage of Households that Use Water Conservation Devices in Home, 1994 and 2002/03

(a) 2002/03



(b) 1994

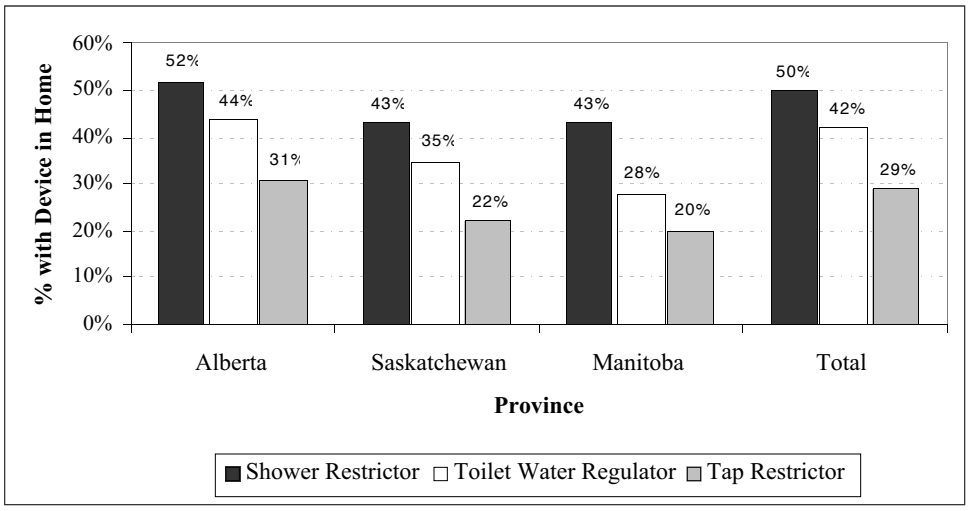


Table 11. Comparison of the Frequency of Recreational Activities along Rivers and Lakes during Typical Summers, 1994 and 2002/03

(a) 2002/03

Type of Activity	Total (n = 267)		Alberta (n = 116)		Saskatchewan (n = 76)		Manitoba (n = 750	
	Average # of Times	**Percent Involved**	Average # of Times	**Percent Involved**	Average # of Times	**Percent Involved**	Average # of Times	**Percent Involved**
Walking/Cycling on Shore of River/Lake	44	**81%**	45	**81%**	35	**78%**	52 [c]	**85%**
Camping/Cottage by River/Lake	16	**65%**	12	**65%**	14	**62%**	24 [b,c]	**69%**
Swimming/Wading	19	**63%**	18	**60%**	16	**58%**	24	**73%**
Sport Fishing	19	**45%**	12	**31%**	16	**40%**	25 [b]	**71%**
Canoeing/Rowing	11	**39%**	8	**43%**	6	**30%**	20 [b,c]	**41%**
Power Boating	14	**34%**	9	**28%**	12	**32%**	21 [b]	**44%**
Photography/Painting	16	**26%**	20	**28%**	12	**29%**	16	**19%**
Hunting	16	**13%**	15	**10%**	12	**8%**	18	**24%**
Jet-Skiing	17	**6%**	29	**5%**	7	**9%**	16	**4%**
Commercial Fishing	64	**4%**	94	**1%**	7	**3%**	76 [c]	**9%**

Significant Differences between (p < 0.05; Method Used: Independent Sample Test/Student T-Test):
a. Alberta and Saskatchewan b. Alberta and Manitoba c. Saskatchewan and Manitoba

(b) 1994

Type of Activity	Overall		Alberta		Saskatchewan		Manitoba	
	Average # of Times	**Percent Involved**	Average # of Times	**Percent Involved**	Average # of Times	**Percent Involved**	Average # of Times	**Percent Involved**
Walking/Cycling on Shore of River/Lake	20	**82%**	22	**85%**	16	**73%**	21	**72%**
Camping/Cottage by River/Lake	14	**76%**	14	**76%**	12	**77%**	23	**76%**
Swimming/Wading	11	**70%**	11	**70%**	11	**69%**	22	**74%**
Sport Fishing	7	**49%**	8	**48%**	6	**51%**	18	**68%**
Canoeing/Rowing	4	**42%**	4	**41%**	3	**47%**	8	**52%**
Photography/Painting	5	**36%**	6	**36%**	5	**36%**	5	**35%**
Power Boating	4	**27%**	4	**25%**	4	**36%**	23	**53%**
Hunting	1	**8%**	1	**7%**	2	**13%**	2	**16%**
Jet-Skiing	1	**6%**	1	**7%**	<1	**7%**	1	**7%**
Commercial Fishing	.1	**1%**	<.1	**1%**	<.1	**1%**	3	**5%**

Source: PFSRB/Prairie Research Associate Inc. (1994: pp. 2-25)

in Manitoba (73%) than in Alberta (60%) and Saskatchewan (58%). The differences between Alberta and Saskatchewan were statistically insignificant, suggesting that residents in these provinces shared similar levels of interest in the listed recreational activities.

Analysis of Opinions and Attitudes Towards Environmental Management by Personal Characteristics

Involvement in Environmental Organizations

A majority of respondents (83%) indicated that they were not members of any environmental group or organization. Only 17% said that they were environmental organization members.[21] Fifty-one percent of those who belonged to an environmental group were males. More than half (52%) of non-members were female.

Similar to the 1994 study results, respondents who were environmental group members had a higher average rating than non-members for each of the environmental actions (**Table 12**). This suggests that environmental group members had a greater interest in environmental issues than non-members. **Table 12** shows that most differences between the two groups were statistically significant. This result implies that interest in environmental issues influenced perspectives on environmental protection or preservation. As in 1994, the most important environmental action for both groups was a need to reduce water pollution, and less interest in development of water-related tourism.

In the same vein, environmental group members were more concerned than non-members about water management issues. In both the 1994 and 2002/03 studies, the former had higher average ratings for all the water management issues than the latter (**Table 13**). It is important to note that differences between the two groups were statistically significant, except for differences regarding pollution from industries, which received similar high average ratings (mean rating above 8.0). More than half of environmental group members (59%) and non-members (58%) rated industrial pollution 9 or 10 out of 10, meaning that both groups were extremely concerned about this problem. **Table 13** shows that pollution from industries was the most important issue for both groups in 1994. In the 2002/03 survey, pollution from cities and towns was both groups' most important water management concern. Sixty-four percent of environmental group members were extremely concerned (rating of 10 out of 10) about this issue compared to 47% of non-members who held the same view. Loss of fish habitat was the second most important concern for environmental organization members. As in 1994, both groups were not very concerned about recreation development along rivers and lakes.

Table 12. Importance of Environmental Group Membership in Ranking Environmental Actions, 1994 and 2002/03 (Rating: 0 = Not at All Important, 10 = Extremely Important)

Environmental Action	2002/03		1994	
	Members (n = 39)	Non-Members (n = 212)	Members (16.5%)	Non-Members (83.5%)
	Average Rating	Average Rating	Average Rating	Average Rating
Reducing Pollution of Waters	9.4	9.3	9.6 *	9.2
Wetland Preservation	9.3 *	8.0	8.5 *	7.6
Protecting Wildlife Habitat	9.2 *	8.6	9.3 *	8.6
Protecting Fish Habitant	9.2 *	8.4	8.9 *	8.3
Reducing Pollution of the Atmosphere	9.0	8.9	9.1	9.0
Re-forestation	8.9	8.3	9.0	8.8
Preservation of Old Growth Forest	8.2 *	7.4	8.1	7.6
Creating More Protected Areas	8.2 *	7.4	8.2 *	7.4
Creating Water-Related Tourism Dev.	5.8	5.5	5.7	5.8

* **Significant Difference (p < 0.5; Method: Mann-Whitney U-Test)**

Table 13. Importance of Environmental Group Membership in Ranking Concern about Water Management Issues, 1994 and 2002/03 (Rating: 0 = Not a Concern at All, 10 = Of Great Concern)

Type of Concern	2002/03		1994	
	Members (n = 39)	Non-Members (n = 211)	Members (16.5%)	Non-Members (83.5%)
	Average Rating	Average Rating	Average Rating	Average Rating
Pollution from Cities & Towns	9.3 *	8.5	9.0 *	8.3
Loss of Fish Habitat	8.9 *	8.0	8.6 *	8.0
Pollution from Industries	8.8	8.5	9.4 *	8.9
Loss of Wetland & Riverbank Habitat	8.8 *	7.8	8.5 *	7.7
Agricultural Practices	8.7 *	7.5	7.7	7.4
Amount of Water Used in Homes	8.7 *	7.3	6.8	6.7
Protecting Ground Water	8.6 *	7.7	8.9	8.6
Forestry Practices	8.5 *	7.6	8.3	7.9
Rivers & Lakes Water for Irrigation	8.0 *	6.5	7.1	6.5
Loss of Heritage Resources	7.5 *	6.4	7.2	6.6
Recreational Development	7.1 *	5.9	6.0	5.8

* **Significant Difference (p < 0.5; Method: Mann-Whitney U-Test)**

Perceived Knowledge about Water Management Issues

This section examines the relationship between perceived level of knowledge about water management issues and interest in obtaining more information on that subject.[22] The 1994 study pointed to a significant positive relationship between the two variables. This suggests that interest in greater water management information decreased with higher levels of knowledge about water management. **Figure 10b** shows that a vast majority of respondents (73%) who gave higher ratings (rating of 8 to 10) for their knowledge of water management issues were also more likely to indicate high interest (rating of 7 to 10) in such information. The reverse was the case for those who gave low ratings (rating of 0 to 5) for their perceived level of knowledge of water management issues.

This study points to similarities between the two groups. A correlation analysis ($r = 0.060$) indicated that respondents' level of knowledge about water management issues did not influence their desire for more information on this subject.

Figure 10a shows that both those who gave a higher rating (rating of 8 to 10) for their perceived level of knowledge of this subject and those who rated it between 0 and 5 were equally interested. Approximately two-fifths of each group were greatly interested (rating of 7 to 10) in more water management information. However, 23% of each group of survey participants were not interested (rating of 0 to 3) in such information.

In both studies, the overall proportion of those interested in receiving additional information far outweighed those who were not interested. This implies that, regardless of their level of water management knowledge, Basin residents were still interested in receiving more information.

Demographic and Social Characteristics of Respondents

This section examines respondents' demographic characteristics and how these features contributed to shaping opinions and attitudes about concerns, knowledge, and management of the environment. The following is a summary of respondents' demographic characteristics.

Gender[23]

Fifty-two percent of respondents were female, while 48% were male. Provincially, more than half of respondents in Manitoba (54%) and Saskatchewan (57%) were female. The reverse was true in Alberta, where more than half were male (53%).

Age[24]

Respondents' ages ranged between 18 and 85 years, while the mean age was 47.1 years.

A majority were between ages 40 and 64 years (48%), followed by those below age 40 years (35%), and those above age 64 years (17%). Seventy percent of females were above 39 years compared to their male counterparts (59%) in the same age cohort.

Length of Time in Current Community[25]

On average, most respondents had lived in the River Basin for 25 years. Slightly more than half of residents surveyed (51%) had lived in their community for over 20 years; 19% had lived in the Basin for less than 6 years. Basin residency length ranged from 2 months to 85 years.

Education[26]

More than half (61%) of respondents had acquired a post-secondary education. Thirty-five percent had only attained a high school education, and a few (5%) said that their educational status was below high school level.

Family Income[27]

The average household income was $45,039.49. Thirty-six percent of the respondents had an average yearly household income of $50,000 or more, while 38% earned less than $35,000 per annum. The remainder (26%) had household incomes between $35,000 and $49,999.

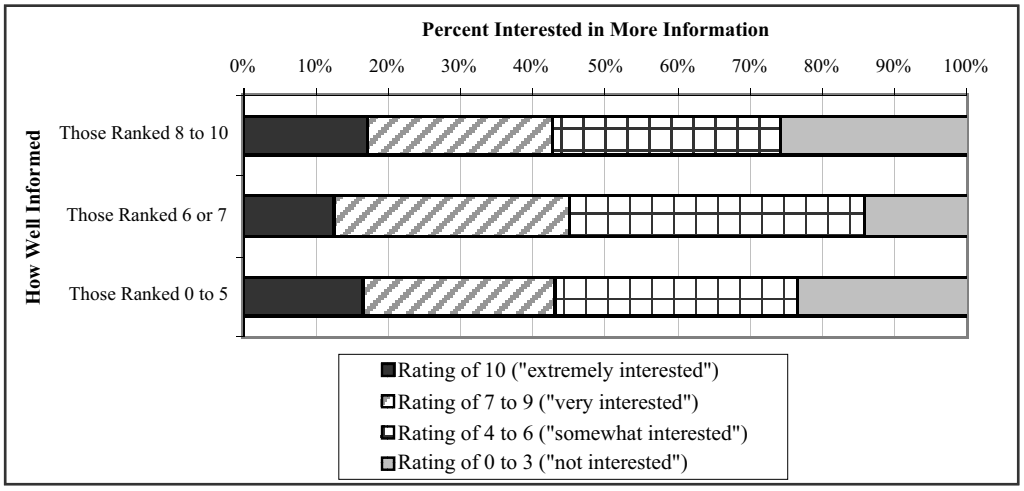
Gender and Water/Environmental Management

Gender played a key role in the importance that Basin residents attached to issues about the environment and resource management. On average, there were significant variations between female and male respondents' ratings concerning the importance that they attached to environmental actions mentioned in the survey. In all cases, females' average ratings were higher than those of their male counterparts (**Table 14**). This result was similar to the 1994 study.

As in 1994, reducing water and atmospheric pollution were the two most important environmental issues cited by both female and male River Basin residents. In this study, most female (78%) and male (64%) respondents thought that reducing water pollution was an extremely important issue (10 out of 10 rating). Both groups shared similar average ratings of their local water quality (i.e. a mean rating of 6.8 for males and 6.6 for females). These results point to a need for improvement in the quality of this resource. Also, 68% of the female respondents, compared to 48% of their male counterparts, deemed atmospheric pollution to be an extremely important issue (10 out of 10 rating) that needs significant attention. As in 1994, their least important environmental concern

Figure 10. Percent Interested in More Information on Water Management by Perceived Knowledge about Water Management Issues, 1994 and 2002/03

(a) 2002/03



(b) 1994

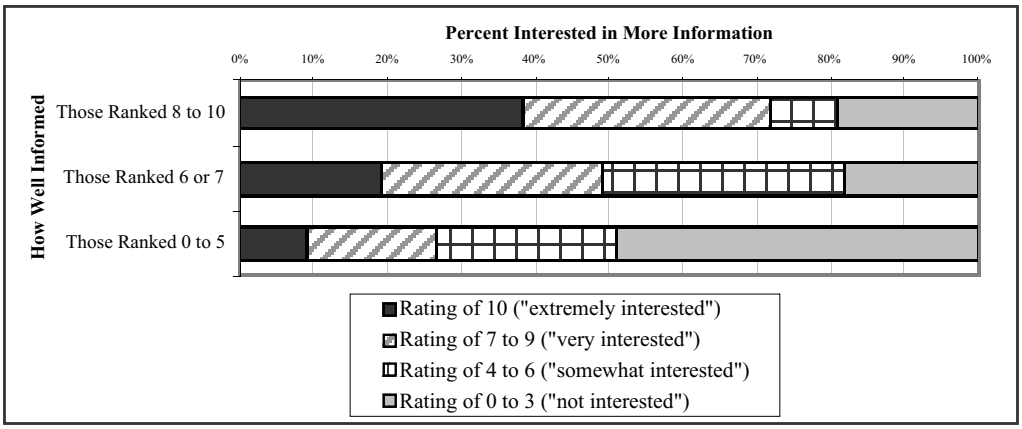


Table 14. Mean Ranking of Importance of Environmental Actions by Gender, 1994 and 2002/03
(Rating: 0 = Not at All Important, 10 = Extremely Important)

Environmental Action	2002/03		1994	
	Female (n = 126)	Male (n = 125)	Female (50.7%)	Male (49.3%)
	Average Rating	Average Rating	Average Rating	Average Rating
Reducing Pollution of Waters	9.6 *	9.1	9.5 *	9.1
Reducing Pollution of the Atmosphere	9.3 *	8.6	9.5 *	8.6
Protecting Wildlife Habitats	8.8	8.5	9.0 *	8.5
Protecting Fish Habitants	8.8	8.3	8.6 *	8.1
Re-forestation	8.7 *	8.1	9.0 *	8.7
Wetland Preservation	8.3	8.1	7.8	7.7
Creating More Protected Areas	7.9 *	7.0	8.0 *	7.1
Preservation of Old Growth Forest	7.8 *	7.2	8.3 *	7.0
Creating Water-Related Tourism Dev.	6.0 *	5.1	5.8	5.7

* **Significant Difference (p < 0.5; Method: Mann-Whitney U-Test)**

Table 15. Mean Ranking of Concern about Water Management Issues by Gender, 1994 and 2002/03
(Rating: 0 = Not a Concern at All, 10 = Of Great Concern)

Type of Concern	2002/03		1994	
	Female (n = 126)	Male (n = 125)	Female (50.7%)	Male (49.3%)
	Average Rating	Average Rating	Average Rating	Average Rating
Pollution from Cities & Towns	8.9 *	8.3	8.8 *	8.1
Pollution from Industries	8.9 *	8.2	9.3 *	8.8
Loss of Fish Habitat	8.3	8.0	8.6 *	7.9
Loss of Wetland & Riverbank Habitat	8.2 *	7.7	8.1 *	7.6
Amount of Water Used in Homes	8.0 *	7.1	7.4 *	6.1
Protecting Ground Water	7.9	7.7	8.9 *	8.4
Forestry Practices	7.9	7.6	8.4 *	7.6
Agricultural Practices	7.8	7.6	7.6	7.3
Rivers & Lakes Water for Irrigation	6.9	6.5	6.8	6.4
Loss of Heritage Resources	6.9 *	6.1	7.3 *	6.1
Recreational Development	6.3	5.9	6.1 *	5.5

* **Significant Difference (p < 0.5; Method: Mann-Whitney U-Test)**

was development of water-related tourism activities within the River Basin. Only 12% of males and 14% of females said that this issue was extremely important.

Table 15 presents male and female respondents' opinions regarding their concern with River Basin water management issues. In both 1994 and 2003/03, female respondents consistently attached higher importance than their male counterparts to all eleven water management issues provided in the survey. In five cases, the disparities were statistically significant (**Table 15**). For example, 58% of female respondents cited that they were greatly concerned (10 out of 10 rating) with pollution from cities and towns compared to 42% of male respondents. Also, pollution from industries was a great concern for 57% of female respondents compared to 44% of their male counterparts.

Despite females' high concern for water management issues in their local areas, few (8%) compared to males (14%) had ever been personally involved in water management processes.

It was also noted that females (mean rating of 3.97) were less likely than males (mean rating of 4.65) to be personally involved in a public water management process in the future. Again, slightly more males (16%) than females (14%) belonged to an environmental group or organization. Yet, both sexes placed significant importance (mean rating of 8) on involving the public in all water management processes in the River Basin, claiming that they were inadequately informed about these issues. On average, males (mean rating of 5.5) were more likely to be informed about water management issues than females (mean rating of 4.7). Females (mean rating of 6.0), however, were slightly more interested in obtaining additional information on local water management issues than their male counterparts (mean rating of 5.7).

Age and Water Management

Age was another factor that influenced opinions about River Basin water management. Compared to all other age cohorts, most respondents in the 25 to 64 age cohort were more interested in seeing several changes in how local water was managed (e.g. improvement in sewage systems to reduce water pollution) (**Table 16**). This pattern was also noted in the 1994 study. **Table 16** shows that youth (18-24 years) and seniors (65 or older) were more inclined than any other age group to think that either no change was needed in current local water management or had no idea about the kind of changes required.

Level of concern about water management issues varied with age. Older respondents (age 40 or older) were more concerned than younger residents (age 18-39) about each of the eleven water management issues presented in the survey. Average ratings for eight of the water management issues by older respondents were above 8.0 on a ten-point scale compared to only one such rating that received this level for younger respondents. Also, while more than 50% of older respondents said that pollution from cities and

towns and pollution from industries were of great concern (10 out of 10 rating), less than 40% of younger respondents thought so about these issues. Regardless of age, these two issues were of greater concern than any other water management issue. Both groups were less concerned about recreational development (e.g. golf courses) along rivers and lakes. Additionally, older people (mean rating of 6.1) were more likely to obtain additional information about water management issues than younger people (mean rating of 5.4).

Considering a longer lifetime experience with resources and interaction with the environment, one would expect older respondents to be more informed about water management issues than younger respondents. Interestingly, both age groups had similar perceived levels of knowledge about water management issues (i.e. a mean rating of 5.2 for younger respondents and 5.1 for older respondents). Only 3% of younger respondents and 4% of older respondents said that they were very well informed (rating of 10 out of 10) about this subject. This suggests a greater necessity for public education about water management issues for all age groups in the Basin.

Table 16. Effect of Age on Water Resource Management Opinions, 1994 and 2002/03

Type of Change	Age Group							
	18 - 24 %		25 - 39 %		40 - 64 %		65 or Older %	
	2002/03 (n=25)	1994	**2002/03 (n=77)**	1994	**2002/03 (n=136)**	1994	**2002/03 (n=47)**	1994
No Changes Needed	**12**	16	**9**	13	**10**	20	**13**	32
Less Pollution/Better Sewage Systems	**20**	46	**31**	45	**23**	31	**23**	31
Other Changes	**20**	17	**39**	25	**37**	26	**30**	18
Do Not Know/No Response	**48**	21	**21**	18	**30**	23	**34**	19
Total	**100**	100	**100**	100	**100**	100	**100**	100

It was also noted that respondents' age did not affect opinions on water quality and how River Basin water was managed. Average ratings of perceived water quality for both younger and older respondents were below 7.0. Similarly, both groups scored a mean rating of 6.0 on their satisfaction with water resource management. These results suggest that both age groups agreed that more needed to be done to improve and manage water resources in this geographic region.

A majority of each group (66% of younger and 68% of older respondents) provided significantly high ratings (rating of 8 to 10) for public involvement in all water

management processes. Unfortunately, only a few would like to be personally involved in such a public process in the future (**Table 17**). Similar results were noted in the 1994 study. As in 1994, the 65 years or older age group (mean rating of 2.6) were the least likely to be involved in a public water management process. In 1994, younger respondents were the most likely group to be engaged in such a public process, but the 40 to 64 age group were the most likely in 2002/03. There was no apparent reason for this change, but, perhaps, this was due to a demographic shift.

Table 17. Effect of Age on Involvement in Public Process for Water Resource Management, 1994 and 2002/03
(Rating: 0 = Definitely Would Not, 10 = Definitely Would)

Age Group (in years)	Average Rating		% Giving Rating of 8 to 10		% Giving Rating of 5 to 7	% Giving Rating of "0"
	2002/03	1994	**2002/03**	1994	**2002/03**	2002/03
18 – 24 (2002: n = 24)	**4.1**	5.8	**17%**	27%	**29%**	17%
25 – 39 (2002: n = 62)	**4.1**	5.7	**19%**	28%	**26%**	24%
40 – 64 (2002: n = 116)	**5.2**	4.7	**34%**	18%	**31%**	21%
65 or Older (2002: n = 38)	**2.6**	2.8	**11%**	8%	**21%**	50%
Total (2002/03: n = 252)	**4.3**	5.0	**24%**	22%	**28%**	27%

Educational Status and Water Management

A stepwise regression analysis indicated that, among four demographic characteristics (age, education, gender, length of residence), education, followed by gender, were the most important factor in shaping respondents' perceived level of knowledge about water management issues. As noted earlier, male respondents indicated that they were more informed about this subject than their female counterparts.

Table 18 shows that, on average, perceived level of knowledge about water management issues increased with level of education. This contradicts the 1994 study. It was noted that, on average, respondents who had attained a post-secondary education were more informed about water management issues than those who had a grade twelve education or less. Respondents who had less than high school education were the least informed about this subject. A quarter of this respondent group said that they were not at all informed (rating of 0 out of 10) about local water management issues compared to only 2% of those who had acquired a post-secondary education who also felt this way (**Table 18**).

The disparity in perceived level of knowledge about environmental issues is attributed not only to level of education but also accessibility of information to various groups or individuals. Respondents who had received a post-secondary education were more likely than those with a lower level of education to use any of the following sources to obtain information on environmental issues: government publications, industrial publications, environmental group publications, television or radio programs, schools or universities, and other sources, such as the internet. Newspapers or magazines and television or radio news were the two main methods used in 1994 to obtain information on environmental issues by most respondents, regardless of educational status. Respondents who had a post-secondary or high school education tended to rely more on newspapers or magazines than television or radio news, but those with less than a high school education preferred television or radio news to any other medium.

Table 18. Effect of Educational Status on Knowledge about Water Management Issues, 1994 and 2002/03
(Rating: 0 = Not at All Informed, 10 = Very Well Informed)

Educational Status	Average Rating		% Giving Rating of 8 to 10		% Giving Rating of 5 to 7	% Giving Rating of "0"
	2002/03	1994	2002/03	1994	2002/03	2002/03
Less than High School (2002: n = 12)	4.3	5.8	25%	25%	42%	25%
High School (2002: n = 85)	4.7	5.6	11%	18%	54%	12%
Post-Secondary (2002: n = 165)	5.3	5.3	14%	11%	55%	2%
Total (2002: n = 262)	5.1	5.5	13%	16%	54%	7%

It was also important to examine the impact that respondents' level of education had on their perception of environmental actions and the likelihood of them becoming involved in resource or environmental management. It was noted that education levels had little influence on how residents felt about reducing water and atmospheric pollution, protecting wildlife habitats, and developing water-related tourism activities. Regardless of educational status, more than 90% of respondents held that reducing pollution of rivers and lakes was their greatest concern (ratings of 9 above). Again, more than 80% provided high ratings (rating of 8 to 10) for reduction of atmospheric pollution and protection of wildlife habitats. On average, increasing levels of education decreased importance attached to protecting wildlife habitats (mean ratings of 9.6 to 8.6) and fish habitats (mean ratings of 9.9 to 8.4). Although interest in developing water-related tourism activities increased with higher education levels (mean ratings of 4.1 to 5.7), most residents (more than 75%) in all three educational status groups gave low ratings for

this particular action. Reforestation, old growth forest preservation, and wetlands preservation were given high ratings by respondents without a high school education.

Satisfaction with River Basin water resource management increased with higher education levels. Thus, respondents who possessed a post-secondary education (mean rating of 6.2) were more content with the current water management system than those who had a high school education (mean rating of 5.8) or less than a high school education (mean rating of 4.9). Consequently, the importance that each of these groups assigned to public involvement in managing local water resources decreased with higher education levels (i.e. average ratings of 8.6, 8.2, and 7.7 for less than high school, high school, and post-secondary, respectively).

Overall, educational status had no influence on the importance that respondents attached to most environmental actions presented in the survey. Similarly, education's influence on respondents' past experience in water resource management was statistically insignificant ($r = -0.077$). More than 85% of respondents, regardless of educational status, said that they had never been involved in any public water management process. However, educational status had a significant positive relationship ($r = 0.141$, $p < 0.05$) with the likelihood of personal involvement in an environmental management process. Respondents' future interests in such public activities decreased with level of education. Forty-four percent of those without a high school education thought that they would definitely not like to be involved (rating of 0 out of 10) in such public activities, compared to 34% of those who had high school education and 19% of those who had completed post-secondary education.

Length of Residence and Water Resource Management

Despite a wide variation in the length of time that people had lived in their community, respondents' average ratings for water quality (**Table 19**) were very close to the overall figure of 6.7 (**Figure 4**). This means that differences in water quality opinions between recent and long-term River Basin residents were statistically insignificant. Both in 1994 and 2002/03, most respondents thought that River Basin water quality was not in excellent condition. As noted previously, fewer than 50% of respondents, regardless of length of residence, rated local water quality as between 8 and 10.

Notwithstanding the similarity of opinions, long-term residents were more likely to rate water quality slightly lower (mean rating of 6.5) than the most recent residents (mean rating of 6.9). The reverse was the case in 1994, when long-term residents gave higher ratings for water quality than recent residents (**Table 19**). A correlation analysis indicated that the observed negative relationship between lengths of residence and water quality was insignificant. However, one can partly attribute this distinction to variations in time and space of residence. It is expected that long-term residents would have more experience and ideas about water conditions in River Basin rivers and lakes than recent

residents, and this may have influenced their perspective on water quality. On the other hand, recent residents' opinions were possibly influenced by knowledge of water quality in their previous places of residence and rated River Basin water quality by comparison.

Table 19. Attitudes Towards Quality of Water by Length of Residence, 1994 and 2002/03
(Rating: 0 = Terrible, 10 = Excellent)

Year in Community	Average Rating		% Giving Rating of 8 to 10		% Giving Rating of 5 to 7
	2002/03	1994	**2002/03**	1994	**2002/03**
5 Years or Less (2002: n = 48)	**6.9**	5.6	**48%**	17%	**40%**
6 – 10 Years (2002: n = 24)	**6.6**	5.3	**34%**	17%	**50%**
11 – 20 Years (2002: n = 51)	**6.9**	6.0	**47%**	30%	**41%**
Over 20 Years (2002: n = 126)	**6.5**	6.2	**38%**	34%	**50%**
Total (2002: n = 252)	**6.7**	5.8	**42%**	26%	**46%**

Table 20. Effect of Length of Residence on Involvement in Public Process for Water Resource Management, 1994 and 2002/03
(Rating: 0 = Definitely Would Not, 10 = Definitely Would)

Years in Community	Average Rating		% Giving Rating of 8 to 10		%Giving Rating of 5 to 7
	2002/03	1994	**2002/03**	1994	**2002/03**
5 Years or Less (2002: n = 48)	**4.8**	5.4	**24%**	29%	**31%**
6 – 10 Years (2002: n = 24)	**5.3**	5.7	**24%**	24%	**44%**
11 – 20 Years (2002: n = 51)	**4.9**	4.8	**33%**	20%	**29%**
Over 20 Years (2002: n = 126)	**3.4**	4.3	**20%**	16%	**25%**
Total (2002: n = 252)	**4.3**	5.0	**24%**	22%	**28%**

Correlation analyses indicate a significant negative relationship ($r = -0.225$, $p < 0.01$) between length of residence in the community and involvement in public water management processes. This implies that long-term Basin residents were less likely to

be personally involved in public water management issues than recent residents. **Table 20** shows that, on average, long-term residents were less interested (mean rating of 3.4) in public water management processes than more recent residents (mean rating of 4.8). These findings were also noted in the 1994 study. More than half of recent residents (55%) compared to less than half of long-term residents (45%) gave a rating of 5 or higher regarding the likelihood of their involvement in such public issues.

The relationship between respondents' views on water quality and the likelihood of personal involvement in a public water management process was examined using a correlation analysis procedure. The results of this analysis suggested a significant negative relationship ($r = -0.237$, $p < 0.01$) between water quality and involvement in water management. Respondents who gave high ratings for water quality were less likely to be personally involved in public water management issues than those who provided low ratings. This means that respondents who provided high ratings for water quality did not see a need for public involvement in managing water resources, as it appears that they were content with their current water management system.

A significant positive relationship ($r = 0.269$, $p < 0.01$) between the importance of public inputs in water management and the likelihood of respondents' personal involvement in public water management process was in keeping with the foregoing claim. Those who provided high ratings (rating of 8 to 10) for public input into water management also rated personal involvement in such a public process between 5 and 10, although they were in the minority (41%).

Summary and Conclusions

This report has examined several public opinions on issues related to water resources and environmental management within the Saskatchewan River Basin. There were more similarities than differences between the 1994 and 2002/03 studies. The principal findings include:

- Basin residents still placed significant importance on most environmental actions, particularly reducing water and atmospheric pollution.
- They were also concerned about several water management issues, particularly pollution from cities, towns, and industries, and loss of fish and wildlife habitats.
- As in 1994, most respondents, regardless of age, gender, or level of education, agreed that more needed to be done to improve and manage River Basin water resources. Although satisfaction with Basin water quality was higher than in 1994, respondents still thought it below their expectations.
- Respondents overwhelmingly agreed that definitions of water resource management responsibility should be broadened to capture those at the grassroots, and not limited

solely to those at the top of the administrative hierarchy (i.e. municipal, provincial, and federal governments).

- While the mass media remains the most important means used to obtain environmental information, this study noted a significant decline in the number of respondents who preferred using more traditional methods for disseminating information on environmental issues, and a significant increase in the use of the internet as a source of information.
- The 1994 study suggested that respondents' interest in greater water management information decreased with their perceived level of knowledge about such issues. This study's findings point to connected interests in increased information on water management by respondents in relation to their level of perceived knowledge about the subject.
- Education and gender were much more important than age and length of residence in shaping perceived level of knowledge about water management issues. It was noted that respondents with a high level of education had greater access to information on environmental issues. These respondents thought that they had in-depth knowledge about these issues.
- The importance that respondents placed on environmental actions and water management issues varied with gender and membership in an environmental organization. Female respondents and environmental organization members attached more importance to these issues than male respondents and non-members.
- Respondents' lack of interest in a public water management process was largely influenced by level of education and length of residence, rather than gender or age. Both studies acknowledged that long-term Basin residents were less interested in public water management process than more recent residents.
- Ambivalence to participate in future public environmental management activities contradicted respondents' strong support for public involvement in such endeavours.

RECOMMENDATIONS

The following recommendations are provided for consideration:

1. Future investigations should focus on examining why differences exist between attitudes towards public involvement and lack of personal participation in environmental management activities, and how to balance respondents' contrasting attitudes towards environmental issues.
2. Public education should be reinforced along these lines. Certainly, effective public education on these matters will help shape public attitudes towards water and environmental management processes. It was noted that age had no effect on

perceived levels of knowledge about environmental management issues. Therefore, public education on this subject is necessary for all age groups.

3. It would have been interesting to know the reasons for respondents' ratings for all water management and environmental issues presented in the survey, but they were not asked to comment on their ratings. As a result, it was challenging to discern reasons for some results (e.g. differences between female and male respondents' opinions). Future research should consider the possibility of adding respondents' comments to ratings.

4. The ratings scale used in both studies should be reconsidered. Consideration should be given to categorizing different levels of importance in future investigations to provide clearer interpretations of survey results.

5. Several survey questions should be modified to avoid ambiguous interpretation. One question about water quality (**Question 14, Appendix 1**), for example, should be divided into water quality in rivers and water quality in lakes, as some respondents thought that river water quality was terrible, but the lake water's quality was excellent (or vice versa). In its present form, it was occasionally difficult to rate both rivers and lakes together. Also, questions regarding recreational activities in a typical summer (**Questions 42 to 51, Appendix 1**) should be narrowed to number of times in a week that respondents participated in a particular activity as this is much easier to remember than overall summer use (e.g. 94 days or 13 weeks).

NOTES

[1]**Questions 1 to 9**: Thinking about the three Prairie Provinces (Alberta, Saskatchewan, Manitoba), how important to you are each of the following **environmental actions**? Use a scale of 0 to 10, where 0 means **Not at all Important** and 10 means **Extremely Important**.

[2]Partners for the Saskatchewan River Basin. (1994). Saskatchewan Basin-Wide Survey of Residents and Key Informant Interview. Prepared by the Prairie Research Associates Inc., Saskatoon, SK.

[3]**Question 10**: Using a scale of 0 to 10, where 0 means **Not at all Satisfied** and 10 means **Completely Satisfied**, please rate your satisfaction with the management of water resources in your area (that is, within an hour's drive of your home).

[4]**Question 11**: What changes, if any, would you like to see in the way water resources are managed in your area?

[5]**Question 12**: As far as you know, who is responsible for managing water resources in your area?

[6]**Question 13**: How important do you think it is for people in all areas of the Basin, whether in Alberta, Saskatchewan or Manitoba, to have more of a say in the overall management of all water resources in the Basin? Use a 0 to 10 scale, where 0 is **Not at all Important** and 10 is **Extremely Important**

[7]**Question 41**: Would you like to become involved in a public process for managing water resources? Use a scale of 0 to 10, where 0 means you **Definitely Would Not** and 10 means you **Definitely Would** become involved if given the opportunity.

[8]**Question 14**: How would you rate the quality of water in the rivers and lakes in your area? Use a scale of 0 to 10, where 0 means the quality is **Terrible** and 10 means it is **Excellent**.

[9]**Questions 15 to 25**: I'm going to read a list of **water management issues**. I'd like you to rate how concerned you are about each, using a scale of 0 to 10, where 0 means the issue is **Not a Concern at All** and 10 means **It is of Great Concern** to you.

[10]**Question 26**: Overall, how informed would you say you are about water management issues? Use a scale of 0 to 10, where 0 is **not at all informed** and 10 is **very well informed**.

[11]**Question 27**: Where would you go first if you have questions or wanted information about water-related issues in your area?

[12] **Question 28**: How interested would you be in obtaining additional information on

local water management issues? Use a scale of 0 to 10, where 0 is **Not at all Interested** and 10 is **Extremely Interested**.

[13]**Question 29**: How would you best like to receive additional information about water management issues? (READ – Circle all mentions)

[14]**Questions 30 to 39**: In the last year have you ever used any of the following **sources to obtain information on environmental issues** (this series of questions calls for YES or NO answers)?

[15]**Question 40**: Have you personally ever been involved in determining how water should be managed?

[16]**Question 59**: Are you a member of a group or organization that is involved with the environment?

[17]**Question 55**: What is the main source of drinking water in your home?

[18]**Question 56**: Does your home have a water meter?

[19]**Questions 52 to 54**: Do you use any of the following in your home? A tap restrictor, shower restrictor, and device to reduce water volume flushed by toilet.

[20]**Questions 42 to 51**: How often in a typical summer do you do the following activities on or by rivers or lakes in your area? See the list of activities in **Table 11**.

[21]**Question 59**: Are you a member of a group or organization that is involved with the environment?

[22]**Questions 26 and 28**: Overall, how informed would you say you are about water management issues? Use a scale of 0 to 10, where 0 is **not at all informed** and 10 is **very well informed**. How interested would you be in obtaining additional information on local water management issues? Use a scale of 0 to 10, where 0 is **Not at all Interested** and 10 is **Extremely Interested**.

[23]**Question 63**: What is the sex/gender of the respondent?

[24]**Question 57**: In what year were you born?

[25]**Question 60**: How many years have you lived in your community?

[26]**Question 58**: How far have you gone in school?

[27]**Question 62**: I am going to mention a number of broad income categories. When I come to the category which best describes your total family income, please stop me.

Appendix A. Saskatchewan River Basin Telephone Survey, August 2002

Good Evening! I'm calling from Partners for the Saskatchewan River Basin, a non-profit organization. We are calling a random sample of households in Alberta, Saskatchewan and Manitoba to get their opinions on environmental issues especially as they relate to water resources. The survey takes no more than **10 minutes**. Could you take the time now or would some other time be more convenient?

Are you 18 years of age or older? (IF NOT) Could I speak to someone in the household who is?

AS NEEDED:

- We are not selling anything, but only seeking input from the public for an important study.
- We have been engaged by "Partners for the Saskatchewan River Basin" to undertake this study. Partners for the Saskatchewan River Basin is a non-profit organization made up of representatives from public, private, and non-profit organizations.
- If you have any questions please call **Jo-Anne Richter** at (306) 665-6887/477-9139 or toll free 1-800-5678007.

First I'd like to ask you about environmental issues in general

CASE 1: Thinking about the three Prairie Provinces (Alberta, Saskatchewan, Manitoba), how important to you is each of the following **environmental actions**? Use a scale of 0 to 10, where 0 means **Not at all Important** and 10 means **Extremely Important**. (ROTATE)

		RATING
1.	Re-forestation (that is, replanting trees)	____
2.	Preservation of old growth forest (i.e., protecting forest that have never been cut)	____
3.	Wetland preservation (such as, marshes and bogs)	____
4.	Reducing pollution of the rivers and lakes	____
5.	Reducing pollution of the atmosphere	____
6.	Creating more protected areas (that is, areas without development)	____
7.	Creating water-related tourism developments	____

8. Protecting fish habitat ____

9. Protecting wildlife habitat ____

Don't Know 88

No Response 99

***CASE 2*:** Now I'd like you to think about the **management of water resources** in your area, that is, within about an hour's drive of your home. By management of water resources we mean the balance between protection and development of lake, rivers and ground water, including regulating access, the quantity, and the quality of water.

(PROMPT: IF NO WATER WITHIN AN HOUR'S DRIVE: THINK ABOUT THE WATER NEAREST TO YOUR HOME.)

10. Using a scale of 0 to 10, where 0 means **Not at all Satisfied** and 10 means **Completely Satisfied**, please rate your satisfaction with the management of water resources in your area (that is, within an hour's drive of your home).

Rating: _____

Don't Know 88

No Response 99

11. What changes, if any, would you like to see in the way water resources are managed in your area?

……

……

No changes necessary 00

Don't Know 88

No Response 99

12. As far as you know, who is responsible for managing water resources in your area? (RECORD VERBATIM)

……

Don't Know	88
No Response	99

CASE 3: A watershed or river basin is the geographic area drained by a series of lakes and rivers, which eventually takes the water to the ocean. The Saskatchewan River Basin drains 420,000 square kilometres from the Alberta Rockies to Northern Manitoba.

The river and lake water in the base travels 1000s of kilometres before it reaches the ocean. It may be used by other upstream before it reaches your area and is used by others downstream after it passes through your area. Currently, the **public has some say**, so these water resources are managed cooperatively.

13. How important do you think it is for people in all areas of the Basin, whether in Alberta, Saskatchewan or Manitoba, to have more of a say in the overall management of all water resources in the Basin? Use a 0 to 10 scale, where 0 is **Not all Important** and 10 is **Extremely Important**.

Rating:	_____
Don't Know	88
No Response	99

14. How would you rate the quality of water in the rivers and lakes in your area? Use a scale of 0 to 10, where 0 means the quality is **Terrible** and 10 means it is **Excellent**.

Rating:	_____
Don't Know	88
No Response	99

***CASE 4*:** I'm going to read a list of **water management issues**. I'd like you to rate how concerned you are about each, using a scale of 0 to 10, where 0 means the issue is **Not a Concern at All** and 10 means **It is of Great Concern** to you. (ROTATE)

		RATING
15.	Pollution from cities and towns	____
16.	Pollution from industries	____
17.	Recreational development (such as golf courses along rivers and lakes)	____
18.	Agricultural practices (or soil erosion)	____
19.	Forestry practices	____
20.	Amount of water used in people's homes	____
21.	Loss of wetland and riverbank habitat	____
22.	Loss of fish habitat	____
23.	Use of water from lakes and rivers for irrigation	____
24.	Protecting the quality and quantity of ground water (i.e., well water)	____
25.	Loss of heritage resources (such as archaeological sites due to riverbank dev)	____

***CASE 5*:**
Now I'd like you to think about **information on water management**.

26. Overall, how informed would you say you are about water management issues? Use a scale of 0 to 10, where 0 is **not at all informed** and 10 is **very well informed**.

Rating:	_____
Don't Know	88
No Response	99

27. Where would you go first if you have questions or wanted information about water-related issues in your area?

……

Don't Know	88
No Response	99

28. How interested would you be in obtaining additional information on local water management issues? Use a scale of 0 to 10, where 0 is **Not at all Interested** and 10 is **Extremely Interested**.

Rating:	_____
Don't Know	88
No Response	99

29. How would you best like to receive additional information about water management issues? (READ – Circle all mentions)

TV	1
Radio	2
Newspaper	3
Open Houses	4
Mail Pamphlets	5
Utility Bill Stuffers	6
Through Schools	7
Other (Specify)	8
_____	
None	0
Don't Know	88
No Response	99

CASE 6: In the last year have you ever used any of the following **sources to obtain information on environmental issues** (this series of questions calls for YES or NO answers?

		Yes	No	Don't Remember	No Response
30.	Government Publications	1	2	88	99
31.	Industrial Publications	1	2	88	99
32.	Publications from Environmental Groups	1	2	88	99
33.	Newspapers or Magazines	1	2	88	99
34.	TV or Radio News	1	2	88	99
35.	TV or Radio Programs on the Environment	1	2	88	99
36.	Schools or Universities	1	2	88	99
37.	Your Workplace	1	2	88	99
38.	Natural or Heritage Park Publications	1	2	88	99
39.	Any Other Source (Specify)	1	2	88	99

_____

CASE 7: Let me ask you about your **involvement in managing water resources**.

40. Have you personally ever been involved in determining how water should be managed?

Yes	1
No	2
Don't Know	88
No Response	99

41. Would you like to become involved in a public process for managing water resources? Use a scale of 0 to 10, where 0 means you **Definitely Would Not** and 10 means you **Definitely Would** become involved if given the opportunity.

Rating:	_____
Don't Know	88
No Response	99

***CASE 8*:** Now I have just a few questions on your **use of water**.

(a) How often in a typical summer do you do the following activities on or by rivers or lakes in your area?

		# of Times
42.	Power boating	_____
43.	Jet-Skiing	_____
44.	Canoeing or Rowing	_____
45.	Swimming or Wading	_____
46.	Sport Fishing	_____
47.	Commercial Fishing	_____
48.	Hunting	_____
49.	Walking or Cycling on the shore by a river or lake	_____
50.	Photography or Painting by a river or lake	_____
51.	Camping or going to a cottage by a river or lake	_____

(CLARIFY # OF DAYS)

(b) Do you use any of the following in your home? (CHECK ALL MENTIONED)

		Yes	No	Don't Know	No Response
52.	A tap restrictor (i.e., flow regulated taps)	1	2	88	99
53.	A shower restrictor (i.e., flow regulated shower)	1	2	88	99
54.	A device to reduce water volume flushed by toilet (i.e., a low flush toilet)	1	2	88	99

55. ***(c)*** What is the main source of drinking water in your home? Is the source of your tap water from:

A River	1	
A Lake	2	
Ground Water (that is, a well)	3	
Other Sources	4	(Specify) _____
Don't Know	88	
No Response	99	

56. ***(d)*** Does your home have a water meter?

Yes	1
No	2
Don't Know	88
No Response	99

Background Information

***CASE 9*:** Finally I'd like to ask you some **background questions.** These are used for statistical purposes only.

57. In what year were you born?

Year:	19_____
Don't Know	88
No Response	99

58. How far have you gone in school? (DO NOT READ)

0 – 8 Grade School	1
9 – 11 Some High School	2
12 High School Grad	3
Some University/College	4
University Grad	5
Graduate School/Professional	6
Don't Know	88
No Response	99

59. Are you a member of a group or organization that is involved with the environment?

Yes	1
No	2
No Response	99

60. How many years have you lived in your community?

Years:	_____
Don't Know	88
No Response	99

61. Please tell me the first three characters of your postal code (this will only be used to see if there are general patterns across the three provinces:

Postal Code:	_____
Don't Know	88
No Response	99

62. I am now going to mention a number of broad income categories. When I come to the category which best describes your total family income, please stop me.

Under $10,000	1
$10,000 - $20,000	2
$20,000 - $35,000	3
$35,000 - $50,000	4
$50,000 - $75,000	5
$75,000 – 100,000	6
Over $100,000	7
Don't Know	88
No Response	99

THANK YOU FOR YOUR TIME

SEX/GENDER OF RESPONDENT

Male	1
Female	2
Undetermined	88

END TIME: _____ p.m. / _____ a.m.

Appendix B. Executive Summary, Saskatchewan Basin-Wide Survey of Residents and Key Informant Interview (1994).

Survey Of Residents

A survey was conducted of a random sample of 550 residents of the Saskatchewan River Basin in late February and early March 1994. The survey involved 250 residents in Alberta, and 150 each in the Saskatchewan and Manitoba portions of the Basin. Thus Saskatchewan and Manitoba respondents are over-represented in proportion to their share of the Basin population. This stratification was designed to allow for comparisons among the three provinces. When the results below refer to the Basin as a whole, the sample has been weighted so that each province is represented in correct proportion to its population.

Environmental Actions

- Respondents were asked to rate the importance of a number of environmental actions. Of the 10 actions offered two were seen as very important by almost all respondents (parenthetically after each is the average rating out of 10):

  - *reducing pollution in rivers and lakes* (9.3);
  - *reducing pollution of the atmosphere* (9.0).

  Three others were rated highly by respondents:

  - *reforestation* (8.8);
  - *protecting wildlife habitats* (8.7);
  - *protecting fish habitats* (8.4).

  Protecting fish habitats was rated much higher among Manitoba respondents than in the other provinces reflecting the importance of fishing in that portion of the Basin.

- Less important among respondents were these environmental actions:

  - *wetland preservation* (7.7);
  - *preserving old growth forests* (7.7);
  - *creating more protected areas* (7.5);
  - *creating water-related tourism development* (5.8).

Water Management Issues

- Overall, only about one-quarter were highly satisfied (a rating of 8 out of 10 or higher, and an average rating of 6 out of 10) with the management of water resources in their area. Alberta respondents tended to be the least satisfied on average, while Manitoba respondents were the most satisfied.
- When asked what changes if any they would like to see in the way water resources are managed in their area, about 20 percent stated that no changes were necessary. The most common (38%) change suggested was reducing pollution in rivers and lakes in their area.
- However, about 30 percent of respondents stated that they do not know who is responsible for managing water in their area. Provincial or municipal governments (each cited by 28% of respondents) were the most often seen as responsible for water management.
- The vast majority of respondents feel it is very important that people in all areas of the Basin have more of a say in the overall management of all water resources within the Saskatchewan River Basin. Manitobans were the most likely to feel this way, while Albertans were the least likely.
- The respondents' average rating of the quality of the water in the rivers and lakes in their area is 5.8 (on a 0 to 10 scale, where 0 is terrible and 10 is excellent). Manitoba respondents gave the highest rating, with over 40 percent rating the quality as very good (that is, 8 or higher out of 10). Alberta respondents gave the lowest quality rating with 25 percent rating the water quality very good. The higher the perceived quality of water, the more satisfied respondents tend to be with the management of water in their area.

Water Management Concerns

- Respondents were read a list of water management issues and were asked to rate their concern with each. On average, the greatest concern was for:
  - *pollution from industry* (average rating of 9.0 out of 10, where 10 meant a great concern);
  - *protecting the quality and quantity of ground water* (8.6);
  - *pollution from cities and towns* (8.5);
  - *loss of fish habitat* (8.2); and
  - *forestry practices* (8.0).

- Of less concern to respondents were:
  - *loss of wetland and riverbank habitats* (7.8);
  - *agricultural practices* (7.5);
  - *amount of water used in homes* (6.7);
  - *loss of heritage resources such as archaeological sites due to riverbank development* (6.7);
  - *use of water from lakes and river water for irrigation* (6.6); and
  - *recreational developments such as golf courses along lakes and rivers* (5.8).

Information On Water Management

- Saskatchewan River Basin residents do not consider themselves to be very well informed about water management issues. The overall average rating was 5.5 out of 10, about midway between "not at all informed" and "very well informed." About one-quarter classified themselves as well informed.
- The most common sources mentioned by respondents when asked where they would go first to get answers or information about local water issues were a branch or department of their municipal (34%) or provincial (25%) governments. This is not surprising since nearly as many residents had said such government bodies were responsible for water management in their area.
- When asked to rate their personal interest in obtaining additional information on issues of local water management, most respondents showed that they were at least somewhat interested and over 40 percent indicated they were very interested.
- Those who identified themselves as being well informed about local water management issues are also the most likely to express interest in obtaining more information.
- The ways these respondents thought it best to receive additional information were: newspaper, TV, through schools, and mail pamphlets.
- These methods of receiving information are reflected in how these respondents had obtained information on the environment in the last year. Over 80 percent of respondents had received such information from TV or radio news, newspapers or magazines, or TV/radio programs on the environment.
- Respondents rated their likelihood of becoming involved in a public process for managing water resources, if given an opportunity to do so. The average overall rating of 5 out of 10 (where 10 meant they definitely would) indicates some apathy on the part of residents. However, a fifth of these respondents thought they would be very likely to get involved (that is, a rating of 8 or higher out of 10).

Current Water Use

- Although nearly two-thirds (63%) of homes in the Basin have water meters, there are regional differences. Only one-quarter of the Manitoba respondents have meters in their homes. Just over half the Saskatchewan residents (55%) and two-thirds of those in Alberta (66%) have water meters.
- The most common conservation device in use within homes in the Saskatchewan River Basin is a flow-regulating shower head. About half the respondents claim to have such a device, and over 40 percent use some method to reduce the volume of water used by their toilets. Under a third use flow-regulated taps on their faucets. Whether or not a respondent's home is metered makes no difference in their use of these devices.
- The most popular water-related activity overall is walking or cycling along rivers and lake shores, mentioned by over 80 percent of Basin residents. Three quarters also camp along a river or lake during a typical summer, or have a cottage in such an area. Swimming and wading was cited by 70 percent of respondents.

  All the other activities are undertaken by less than half the respondents during the summer. Hunting, jet-skiing, and commercial fishing are activities for under 10 percent of the Basin population.

Key Informant Interviews

- 20 representatives of organizations with an interest in water management issues representing industry, government, and non-governmental organizations were interviewed.
- All respondents supported the concept of sustainable development, although there were some differences in the definition, approach and implementation.
- The misconceptions about water cited by these respondents as being commonly held by the public were numerous and include:
  - there is an unlimited abundance of water, both in quantity and quality;
  - rivers and lakes are more polluted than they actually are;
  - industry causes most of the water pollution and other negative impacts on rivers and lakes;
  - water delivered to urban residents is contaminated, or in some way a health concern.

- The survey of residents appears to support the view that many of these "misconceptions" are held by the public. For example, the public appears to believe that rivers and lakes are quite polluted and that industry and cities are the main causes of this pollution.
- The major water management issues cited by these respondents revolved around:
  - educating the public about water management issues;
  - maintaining the quantity and quality of water;
  - allocation of a scarce resource among competing interests;
  - having more input into the management of water resources.
- Several methods of encouraging sustainable water use were mentioned, including:
  - education;
  - greater public involvement in water management;
  - pricing;
  - better government regulation.
- Most respondents acknowledged that there was a need for greater cooperation and coordination among various public, private and non-profit stakeholders in the management of water resources in the Saskatchewan River Basin. The benefits of such cooperation and coordination include:
  - conserving resources;
  - sharing information; and
  - building understanding.
- Respondents gave the following advice to the Partners for the Saskatchewan River Basin:
  - It should try to involve all groups that utilize the Basin, including industry, agriculture, NGOs, and government.
  - The Partners should act as a clearinghouse of water management information to encourage sharing of knowledge.
  - The Partners should develop a plan for educating the public on: the nature of the Basin (its size, the various users, etc.); water management issues and techniques; and the sustainable use of water.
  - It should focus on problems on which it has a realistic chance to make a positive impact.

- It should consider methods used by other successful water resource organizations.
- The Partners must be non-partisan in the educational and organizational activities.
- There is the need for better definitions of the Partners' goals. Some of the goals are seen as "too general."

• Respondents identified several priorities for the Partners for the Saskatchewan River Basin:

- gather and disseminate information of water management issues;
- educate the public;
- facilitate among stakeholders.

CUISR Resource Centre
University of Saskatchewan
289 John Mitchell Building
118 Science Place
Saskatoon SK S7N 5E2 Canada
Phone: 306-966-2121
Facsimile: 306-966-2122
E-mail: cuisr.oncampus@usask.ca

CUISR Web site:
http://www.usask.ca/cuisr/

CUISR Community Liaison Office
St. Paul's Hospital Residence
230 Avenue R South
Saskatoon SK S7M 2Z1 Canada
Phone: 306-978-8320
Facsimile: 306-655-4956
E-mail: cuisr.liaison@usask.ca

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