PUTTING A PRICE

ON HOW MUCH ALBERTANS VALUE THE RELIABILITY OF THEIR DRINKING WATER SUPPLY

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Research conducted 2014-2016

WEPGN
Water Economics, Policy and Governance Network

Canadian Water Network

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WHY DID WE DO THIS RESEARCH?

The importance of safe and reliable drinking water to human health is paramount. Water utility service providers aim to provide quality water to their customers at all times, minimizing disruptions to water systems that may impact the delivery of water. The impacts from increased frequency and severity of summer droughts and forest fires in regions like Alberta are becoming a growing concern, which could lead to increased risks in drinking water system outages or reliability problems (i.e. the interruption of the supply of high quality drinking water) for communities. A vast majority of drinking water in Alberta comes from the Eastern forested slopes of the Canadian Rocky Mountains, and researchers have suggested forest and watershed management as a method of improving drinking water reliability. These practices include the placement of buffer strips along streams to reduce the amount of sediment and debris entering drinking water sources, and reducing of the amount of hazardous forest fuels such as stands of dry trees in the watershed to prevent wildfires. These forest management practices can potentially reduce risks to drinking water reliability and the need for increased investments in drinking water treatment infrastructure.

Initiatives to implement forest and watershed management practices to decrease risks to drinking water supplies already exist in places like Denver, CO. Denver Water, the local water utility, has partnered with the United States Forest Service on a project called ***From Forest to Faucets***, aimed at improving forests and watershed protection over a 5 year period with particular concentration on watersheds that are critical to Denver's drinking water supply. Improving forests and protecting watersheds can limit the impact of sediments on water reservoirs.[1] It can also reduce soil erosion and the risk of forest fires.

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Forest and watershed management practices help maintain the reliability of high quality drinking water supply. A benefit-cost analysis can inform investment decisions regarding such practices. In order to assess the benefits of forest and watershed management practices, it is necessary to determine the monetary value of drinking water reliability in Alberta. This value can be used to compare the costs and benefits of forest management and watershed management to assess the best use of investments in either forest and watershed management ("green" infrastructure) or investments in traditional drinking water treatment ("grey" infrastructure).

This project (2014-2016) provided an estimate of the monetary value that Albertans place on improving drinking water reliability and collected information on Albertans' experiences and risk perceptions of three different water outage scenarios:

1. Short-term outages: water outages lasting a few hours but less than a day
2. Long-term outages: outages lasting 2 to 3 days, and
3. Boil water advisories (issued by health agencies like Alberta Health services (AHS) either as a precaution or response to waterborne diseases). These advisories, on average, last for a month depending on the reasons why they were issued.

WHAT DID WE DO?

The monetary value of environmental resources such as water is difficult to determine because there are often no direct market measures for them. Economists, however, have developed techniques to assess the value of such non-marketed environmental resources. These techniques are broadly grouped into revealed and stated preference techniques. Revealed preference methods determine the value of those resources based on observed behaviour by linking purchases of marketed goods to environmental resources. For example, purchases of in-home water treatment equipment may indicate the demand for improved water reliability, but this equipment may also be purchased to address taste, colour or other aesthetic preferences, rather than health or reliability concerns. Stated preference methods use surveys to determine the amount that the public is willing to pay for improvements in environmental resources that are not bought or sold in a market.

In this study, stated preference methods were used to provide an estimate of the value of drinking water reliability in Alberta. A preliminary survey was constructed and tested with respondents in three focus groups across Alberta. The focus group participants commented on the questionnaire and helped improve the design. A revised survey was pre-tested through a pilot of 155 Albertans. The final survey was implemented by an Edmonton-based survey research firm that recruited respondents from its existing panel of potential respondents. A total of 1250 Albertans completed the survey.

The survey collected information on the respondents' experiences and risk perceptions with three types of water reliability scenarios: short-term outages, long term outages and boil water advisories. The survey then presented the respondents with an alternative that could reduce the likelihood of water outages, but required an increase in their water bills. Using data on respondent choices (either stay with current rates or vote to pay for the alternative), the research team developed econometric models to assess the tradeoffs that Albertans made between improved water reliability and increases in their water bills.

WHAT DID WE FIND?

The survey results indicate that Albertans have not experienced a significant number of challenges that would impact water reliability in the last 10 years. For instance, the average number of short-term water outages experienced by respondents is 1. Compared to urban residents, rural residents experienced twice the average number of water outages.

The survey results also revealed differences in water reliability risk perceptions among Albertans. While around one fifth of the survey respondents do not perceive any risks to their water reliability, 78% of them perceive that the reliability of their drinking water will be reduced in the future. On average, Albertans perceive a 25% annual chance of a short term water outage, a 9% annual chance of longer-term water outages, and a 9% annual chance of boil water advisories. However, statistical test results showed no differences in these perceptions between rural and urban residents of Alberta.

Results from econometric models, using only the 78% of respondents who believe there are risks to the reliability of their future water supply, indicate a willingness to pay more on their water bill for programs that will reduce their risk of drinking water reliability challenges. Albertans who perceive risks in their drinking water reliability are on average willing to pay an additional amount of about $71 per year on their water bills for a management program that would reduce their risk of short-term water reliability challenges by at least 50%. They are also willing to pay $99 on their water bills per year for management programs that will reduce the risk of all three water reliability problems (that is, risks of short-term outages, longer-term outages, and boil water advisories [BWA]).”

The econometric model was modified to include Albertans who do not perceive any risks to their water reliability challenges. Implicitly, these respondents are not willing to pay any extra amount of money for risk reducing programs because they do not believe there are risks to the reliability of their future drinking water supply. The willingness to pay amounts for respondents who perceived risks to reliability and those who do not perceive risks (i.e. $0) were averaged. The results indicate that, as a whole, Albertans, regardless of their water reliability risk perceptions, are willing to pay an additional amount of $63 per year on their water bills to support programs that will reduce water reliability challenges.

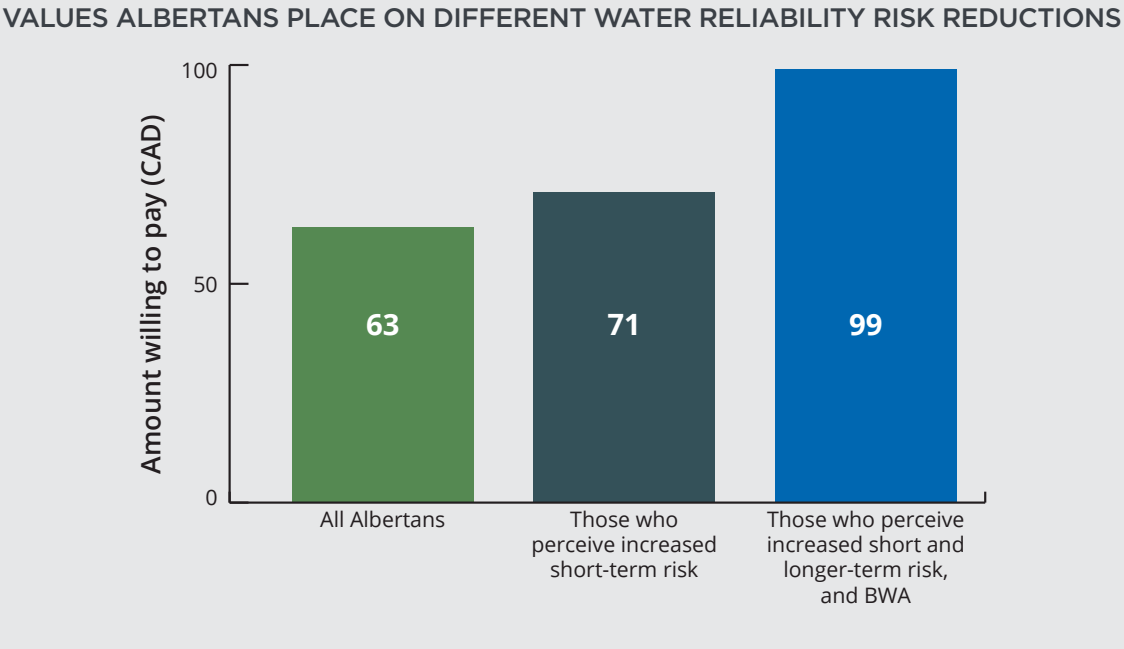

Figure 1: Values Albertans place on different water reliability risk reductions per year

The estimated values (Fig. 1) are for households. To understand the overall value of water reliability to Albertans, the research team aggregated these values over the number of households in Alberta. The 2011 Canada census indicated that there were 1,390,275 private households in Alberta.[2] Using the estimates from the model that account for the entire population ($63 per household), the economic benefit of a program that will reduce water reliability challenges in Alberta is about $88.1 million per year. The benefit can also be estimated for different municipalities. Edmonton has about 450,785 households (Statistics Canada 2011). These numbers imply that the economic value for a 50% risk reduction of water reliability challenges in Edmonton is about $28.6 million per year. Similarly, the value is about $29.4 million per year in Calgary.

POLICY IMPLICATIONS

The experiences and risk perceptions of future water outages by Albertans are valuable for water utility service providers looking to assess the value that their customers place upon certain aspects of their services. On one hand, customers have experienced only a few water reliability challenges to date. This is a testament to the current reliability of the drinking water supply in Alberta. On the other hand, customers expect deterioration in water reliability in the future which may require substantial investments to remedy.

This project also assessed Albertans' preferences for reducing the risks of water outages and boil water advisories. Water utility service providers can compare these estimates with the costs they will incur in the implementation of forest and watershed management options to improve drinking water reliability and inform their investment decisions.

The results can provide water utility service providers with estimates of how much extra households would be willing to pay on their water bills per month in order to avoid water outages. This information will help service providers construct more efficient water management and pricing schemes.

If supported by an economic analysis of costs and benefits, water utility service providers could partner with organizations like Alberta Environment and Parks, using a model similar to the Denver Water framework, to manage forests and watersheds that are particularly critical to the supply of drinking water in the province. This partnership could help water utility providers deliver safe and reliable water to their customers.

Municipalities and water utility service providers in other parts of Canada can follow this framework in order to estimate the values that households place on improving the reliability of drinking water in their communities.

The Water Economics, Policy and Governance Network's (WEPGN) overarching goal is to build knowledge and facilitate exchange between social science researchers and partners, thereby increasing the application of research to decision making and enhancing water's sustainable contribution to Canada's economy and society while protecting ecosystems. WEPGN was established with a SSHRC Partnership Grant. WEPGN's objectives are to:

- → Create a vibrant and multidisciplinary network of Partnerships amongst researchers, government agencies and community groups;
- → Provide Insight by mobilizing knowledge from social science perspectives to improve our understanding of water's role in Canadian society and economy;
- → Strengthen Connections by facilitating a multidirectional flow of knowledge amongst researchers and partners to promote more efficient and sustainable water management;
- → Provide high quality Training experiences for students and practitioners with interests in water policy decision-making and management.

This project by Adamowicz contributes to each of the above objectives, and is a notable example of a project that provides insights by mobilizing knowledge from social science perspectives to improve our understanding of water's role in Canadian society and economy.

WEPGN Water Economics, Policy and Governance Network

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