



Public Perceptions of Drinking Water: A view from British Columbia's Coast

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1. Introduction

Nowhere does the link between human health and the environment manifest itself more strongly than our reliance on fresh clean drinking water [1].

Presently, many coastal communities in British Columbia face pressing drinking water quality issues. For example, in May of 2008 there were 528 boil water advisories in place across the province [2] and currently there are 340 active boil water advisories and water shortages, more than 50 of which are on the coast [3]. Boil water advisories are public announcements advising that tap water should be boiled for drinking and other uses. They aim to prevent waterborne illness due to high turbidity (i.e., high levels of suspended particulates in the water due to rainfall and activities such as logging or construction), disease-causing bacteria, and other contaminants and are issued by local public health units, water utilities, or other such authorities. Water shortages take place when the water supply is, or may become, less than the water demand. Shortages can lead to different measures being put in place, from lawn watering regulations to closures of the water system for hours or even days. The number of active boil water advisories and water shortages ongoing in BC is both striking and alarming given the importance of having access to clean drinking water for human health [4,5]. For example, high turbidity has been linked to both outbreaks of gastrointestinal illness and endemic gastrointestinal illness [6].

In 2010-11 our research team set out to gain a better understanding of how people living on BC's coast perceive the quality and availability of their drinking water. We believe their insights make a useful contribution to understanding some of the challenges regarding access to natural resources being faced in coastal communities across Canada. Our study involved administering a survey to residents of four communities in coastal BC with a history of recent boil water advisories or water shortages, or that are at a risk of having water shortages in the near future, namely: Tofino, Courtenay-Comox, Chemainus, and Pender Island (Figure 1). In this report we share the details of what residents told us. We encourage people to share this report with others who they think are interested in issues related to drinking water in BC. We also welcome questions and feedback, which can be directed to Dr. Ilja Tromp-van Meerveld (ilja@sfu.ca) or Dr. Valorie Crooks (crooks@sfu.ca) in the Department of Geography at Simon Fraser University.

2. Study overview

Tofino is a small town located on the west side of Vancouver Island. It is home to just under 1800 residents, though its seasonal population swells in the summer given its popularity as a tourist destination. Its drinking water comes from nearby Maeres Island, though Ginnard Creek is used as a back-up source. Courtenay and Comox are side-by-side cities on the east coast of Vancouver Island that are commonly referred to collectively as Courtenay-Comox. They have a combined population of just over 34,000 residents. The local water supply comes from Comox Lake. Some residents are on private wells. Chemainus is also located on the east coast of Vancouver Island. It is a small community of approximately 4100 residents. Drinking water in Chemainus comes from the Banon Creek Reservoir. Pender Island is located between BC's mainland and the east coast of Vancouver Island. The Island's population is approximately 3200. Approximately 1200 homes and businesses receive municipal drinking water that is sourced from Magic Lake and Buck Lake. All others are on private wells.



In our study we focused on the communities of Tofino, Courtenay-Comox, Chemainus, and Pender Island because they each have a recent history of boil water advisories or water shortages, or are at a risk of having water shortages in the near future. For example, in the last 5 years (2005-10) Tofino has had 2 boil water advisories, Courtenay-Comox has had 19, Chemainus has had 12, and Pender Island has had 13. A single advisory can last anywhere from a few days to longer than a year. Each community has also faced a number of water shortages over this same 5-year period, particularly during summer months when tourism on BC's coast is active and rainfall can be low. These water shortages have generally been mild and have led to measures such as lawn watering restrictions. The August 2006 water shortage in Tofino led to the most severe measure: shut down of local businesses.



Figure 1: Location of the study sites.

We visited Tofino, Courtenay-Comox, Chemainus, and Pender Island between May, 2010 and January, 2011 to survey residents about their perceptions regarding local drinking water quality and availability. Our survey inquired into issues of: community water quality, boil water advisories and shortages, personal water consumption, and water-health connections. It consisted of 30 questions overall, with an additional 5 demographic questions. People had the option of completing the survey by-hand or having it administered verbally. In order to participate in the study survey respondents had to be aged 18 or over and a resident of one of the communities of focus. The survey took approximately 10 minutes to complete. We aimed to have 40 surveys completed in each community, for a total of 160. We completed 44 in Tofino, 56 in Courtenay-Comox, 48 in Chemainus, and 41 in Pender Island for a total of 189.

We sought what is known as a 'convenience sample' when administering the survey in each community. What this means is that we did not seek a sample of survey respondents that exactly reflects certain population characteristics, and instead asked people who were available to us (e.g., pedestrians, store owners) if they would be interested in participating in the study. People with a variety of backgrounds ultimately

completed the survey. In total, 65% of survey respondents were women. Eighteen percent were aged 18-25, 11% were aged 26-35, 22% were aged 36-50, 34% were aged 51-65, 11% were aged 66-75, while 4% were 75 years of age or older. The average length of residence in the community was 15 years, the median was 11 years, and the range was from less than 1 month to as high as 66 years. In terms of the types of drinking water that survey respondents primarily used, 50% drank municipal tap water, 27% drank filtered municipal tap water, 10% drank private well water, and 12% drank bottled water. In cases where respondents did not drink municipal water (e.g., because they drank water from a private well), they were asked to respond to questions regarding water quality and availability based on their knowledge of the public water supply in their municipality.

3. Key findings by community

TOFINO

A larger proportion of surveyed residents in Tofino (95%) consumed primarily local tap water at home than in any other surveyed community, with the remaining residents consuming private well water. It was the only community in which no survey respondents indicated that they primarily drank bottled water. There was a prevalent sense of satisfaction and pride in the quality of local tap water among those surveyed in Tofino. Very few (2%) thought there was better tap water available in other coastal communities in BC when compared to the municipal water in Tofino. In fact, the majority indicated they were satisfied or very satisfied with the taste (95%), smell (91%) and clarity (98%) of the local tap water. Only a few (7%) thought there had been any deterioration in water quality over the past 5 years.

There was less agreement amongst surveyed Tofino residents regarding issues of drinking water availability when compared to drinking water quality. While the majority (68%) were at least somewhat worried about

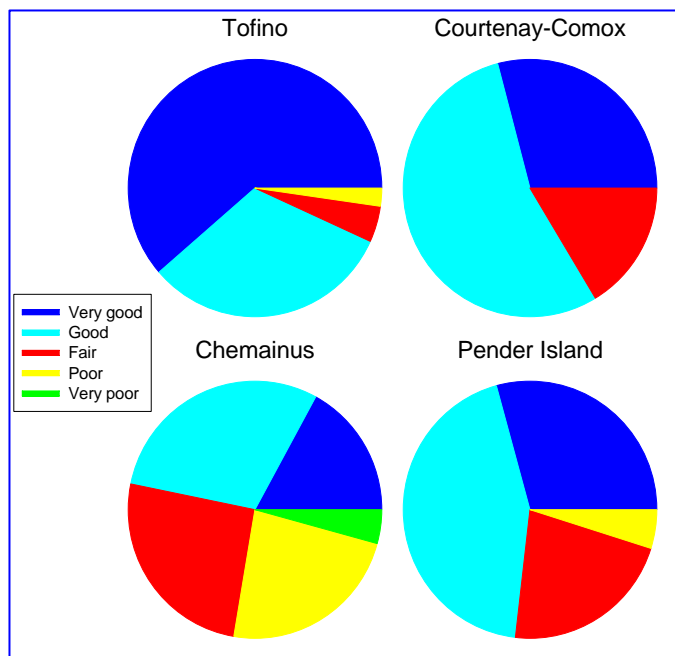


Figure 2: Responses to the question "How would you rate the overall quality of the community's tap water?"

water availability issues, there was a nearly equal number of respondents who thought that the availability of tap water in Tofino had deteriorated (34%) or stayed the same (30%) over the past 5 years. Although a minority, there was also a definite set of residents (18%) who thought that availability had improved in the last 5 years.

Most Tofino respondents (68%) were not concerned about health-related issues derived from tap water, although three (7%) did report experiencing tap water-related health problems at some point in their life. Some indicated they had spoken to health care providers or doctors about issues of water quality or availability at some point in the past; however, respondents had more frequently contacted the media or elected representatives to discuss these issues. This may be because availability was a more dominant concern than safety in Tofino.

COURTENAY-COMOX

Respondents in Courtenay-Comox were generally satisfied with the quality of the drinking water, with 84% saying that they are satisfied or very satisfied and 16% saying that the quality is fair. None said that the quality was poor or very poor. Only 2% of the respondents said that the water quality in Courtenay-Comox was worse than elsewhere on the BC coast, while nearly half said it was better. This demonstrates confidence in the quality of the community's local drinking water.

Eighty-five percent of respondents were satisfied (somewhat or very) with the clarity of the water in Courtenay-Comox, 86% with the smell, 73% with the taste, and 91% with the safety. Most respondents (80%) thought that the quality of the drinking water had remained the same in the past 5 years, 11% thought that it had improved, and 7% thought that it had deteriorated. Most of those reporting that it had deteriorated mentioned that chlorination had increased, thereby decreasing the overall quality. Approximately 20% of respondents said that water availability had deteriorated in the past 5 years, while nearly 75% thought that it had remained the same. Only a small minority (4%) thought that it had improved.

While most respondents in Courtenay-Comox were satisfied with the quality and safety of local drinking water, 25% were worried (somewhat or very) that the current state of access to safe, good quality drinking water was having a negative impact on their health. Two (4%) had spoken with their doctor or another health service provider about this impact. Meanwhile, eight (15%) had contacted an elected representative of government about issues of drinking water quality or availability in the community and 3 (5%) had contacted the media about drinking water related issues.

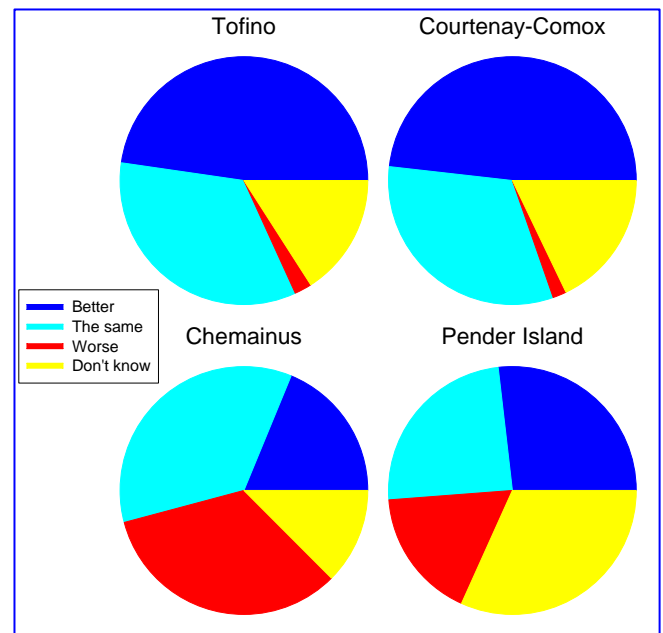


Figure 3: Responses to the question "How would you rate the overall quality of the community's tap water when compared to other communities' water on BC's coast?"

CHEMAINUS

The perceptions of local tap water were split amongst those surveyed in Chemainus, with the community having the largest proportion of people reporting that local drinking water was 'poor' (23%) or 'fair' (26%) when compared to any of the other study communities. Chemainus was also the only community to have respondents report having 'very poor' (4%) drinking water quality. However, 47% did report having very good or good local drinking water quality. While 85% of respondents reported no change in the availability of tap water over the past 5 years, 38% reported a decline in quality over this same period.

Roughly a third of respondents in Chemainus were dissatisfied with the smell and clarity of their water. They were evenly split between reporting satisfaction and dissatisfaction with the taste, with a significant minority (8%) reporting strong dissatisfaction. A slim majority (54%) were 'somewhat' (38%) or 'very satisfied' (19%) with the safety of their water, while 33% were unsatisfied. These responses suggest that there are distinct camps amongst respondents with regard to perceptions of drinking water quality and safety. This may help to explain why one third of respondents, the largest proportion of the four communities

surveyed, thought their local drinking water was inferior to other coastal communities in BC. Despite this, 54% did think that the local tap water was the same, or even better, than water found elsewhere on BC's coast.

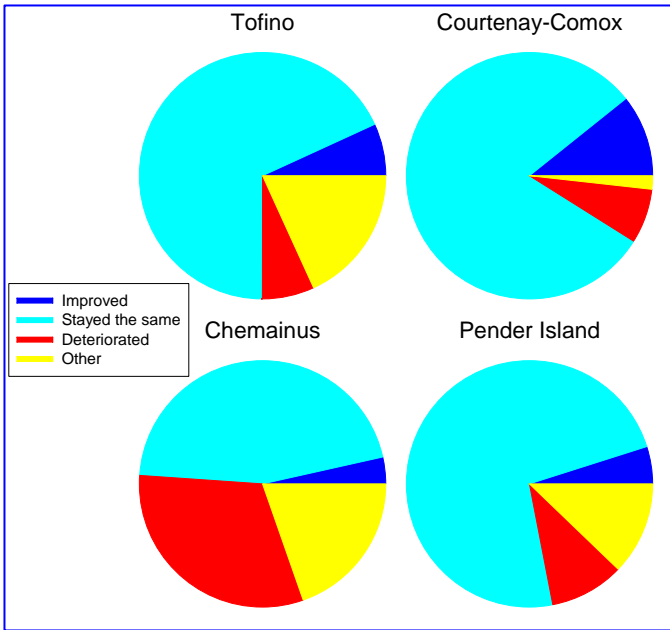


Figure 4: Responses to the question "Do you think that, over the last 5 years, there have been any noticeable changes in the quality of your community's drinking water?"

Although there was a larger proportion of respondents in Chemainus reporting dissatisfaction with drinking water quality than in the other communities, especially with regard to safety, they were only somewhat more likely to report that their drinking water was having a negative impact on their health. This suggests that respondents are more worried about the *potential* negative health impacts that may be brought on by drinking water instead of ones that have already developed. Respondents in Chemainus, much like those in the other coastal communities surveyed, were more likely to have contacted an elective representative of government (15%) than health care providers (9%) or the media (2%) regarding issues of drinking water quality or availability in the community.

PENDER ISLAND

Pender Island had the largest group of well water drinkers among the surveyed communities, with slightly fewer than 20% using private wells as their main source of drinking water. Almost 75% of the residents surveyed in the community rated their municipal water quality as good or very good, and none rated it as very poor. While the overwhelming majority (78%) thought that there had not been noticeable changes in the quality of the community's drinking water in the last 5 years, a sizable minority (10%) did think that it had deteriorated. Similarly, people had not noticed a significant change in the availability of drinking water in the community, with only a 7% minority indicating that it had deteriorated in the last 5 years.

Although there were not any significant concerns regarding a change in the quality or availability of drinking water, only slightly more than 50% of survey respondents from the community thought that Pender Island's drinking water was better or the same as drinking water elsewhere on BC's coast, with the remainder being uncertain (32%) or thinking that it was worse (17%). This was lower than in any of the other study communities, and suggests that community residents may be actively aware of better municipal

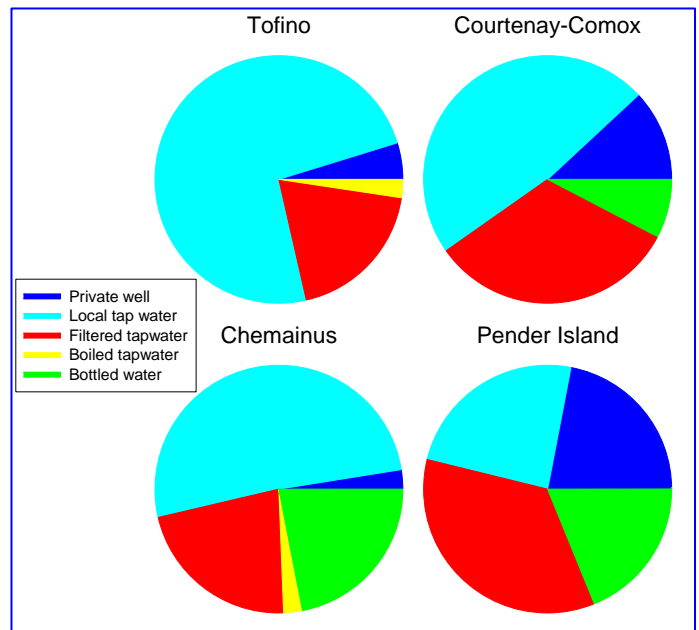


Figure 5: Responses to the question "What type of drinking water do you primarily consume at home?"

drinking water sources elsewhere on the coast. When asked about their level of satisfaction with specific aspects of their drinking water, more than 75% agreed that the clarity, smell, and safety was very or somewhat satisfactory, while just under 50% indicated that the taste was very or somewhat satisfactory. Thus, water taste emerged as being an important concern among surveyed residents relative to other aspects of their drinking water.

More than 30% of the surveyed residents on Pender Island were worried that the current state of access to safe, good quality drinking water in their community was having a negative impact on their health. Meanwhile, only 2% had spoken with their doctor or another health service provider about issues of drinking water quality and availability and the impact these issues are having on their health. This was the lowest rate of any of the surveyed communities. A greater number had contacted an elected representative of government about such issues, specifically 15%. Far fewer had contacted the media about issues of water quality and availability, only 2%. This percentage was the same as in Chemainus and lower than the rates that were reported in Tofino and Courtenay-Comox.

4. Looking across the communities

Within the four communities surveyed, the majority of respondents were satisfied with the quality of their local drinking water. However, in Chemainus a significant portion of respondents thought the quality was poor and that their municipal drinking water was worse than elsewhere on the BC coast. The largest fraction of respondents who thought the water quality had deteriorated in their community over the last 5 years was also found in Chemainus. The dissatisfaction with the local drinking water quality in Chemainus may be directly related to the large number of boil water advisories in the community in recent memory, with 8 of the 12 advisories the community has faced over the last 5 years having been active in 2009 and/or 2010.

Respondents in Tofino and on Pender Island were most worried about the availability of drinking water in their community, with more than 65% noting that they were somewhat worried or very worried about the availability of drinking water in the near future. A larger fraction of respondents in Tofino, when compared to the other communities, answered that availability of drinking water had deteriorated in the past 5 years. However, Tofino also had the largest fraction of respondents who answered that availability had improved in the past 5 years. Meanwhile, almost half of the people surveyed in Courtenay-Comox and one-third of the respondents in Chemainus said they were not worried about the availability of drinking water.

More than three quarters of respondents in all four communities who were not on private wells primarily consumed municipal drinking water at home. The fraction of respondents who regularly drank bottled water at home was highest in Chemainus and on Pender Island (22 and 24 % respectively). The main reasons given for drinking bottled water at home among the respondents in these two communities were taste and safety. More than half of the municipal water drinkers on Pender Island and 40% in Courtenay-Comox used a filter. The main reasons for filtering drinking water were, once again, safety and taste.

When the coastal residents we surveyed were asked about the sources they would turn to for information regarding drinking water quality and availability, most said they would seek information from their regional



health authority. Other popular information sources included non-profit science, environmental or health organization and local government (Table 1).

Information Sources	Tofino	Courtenay-Comox	Chemainus	Pender Island
Non-profit science, environmental or health organizations	68%	45%	37%	63%
Local government	52%	46%	69%	32%
Provincial government	27%	27%	22%	29%
Federal government	16%	16%	12%	12%
Media	27%	21%	20%	10%
Business	14%	7%	4%	7%
Regional health authority	68%	70%	67%	68%
Your doctor	23%	23%	22%	12%
Other: Internet	7%	7%	6%	0%
Other: friends, family, neighbors	0%	4%	4%	12%

Table 1: Percentage of respondents who would turn to these sources of information if they were going to look for information about drinking water quality or availability. Respondents were allowed to select more than one. The “other” category was filled in by the respondents themselves.

Survey respondents in all communities were asked about the factors they thought would limit access to drinking water in the next 5 years. They were not given potential answers to select from. Growth and development were the most frequently mentioned factors across all communities (Tofino: 19%; Courtenay-Comox: 28%; Chemainus: 25%; Pender: 30%), with precipitation, weather and climate change being the second most commonly mentioned factor in all communities except Tofino (Table 2). In Tofino, tourism and tourists were the second most frequently mentioned factor. Overconsumption and misuse was in the top four factors mentioned in all communities except for Chemainus. Infrastructure-related issues were frequently mentioned in Tofino and Chemainus, while pollution and contamination-related issues were frequently mentioned in Courtenay-Comox and on Pender Island (Table 2).

Rank	Tofino	Courtenay-Comox	Chemainus	Pender Island
1	Growth and development	Growth and development	Growth and development	Growth and development
2	Tourists and tourism	Precipitation, weather, and climate change	Precipitation, weather, and climate change	Precipitation, weather, and climate change
3	Infrastructure	Pollution and contamination	Negotiations with First Nations or other government	Overconsumption and misuse
4	Overconsumption and misuse	Overconsumption and misuse	Infrastructure	Pollution and contamination

Table 2: Top 4 most frequently mentioned factors that are going to limit access to drinking water in the community in the next 5 years.

5. Summary

We set out to understand how residents of coastal BC think about the availability and quality of drinking water in their communities. To accomplish this we surveyed residents in four communities with recent histories of boil water advisories and/or water shortages: Tofino, Courtenay-Comox, Chemainus, and Pender Island. A total of 189 surveys were completed. From these surveys we learned that while there is a general satisfaction with municipal drinking water availability and quality in all of these communities, residents do have very distinct concerns regarding the state of current and future access to reliable, good quality drinking



water. For example, residents in Chemainus are particularly concerned with drinking water quality, while residents of Tofino are concerned about drinking water availability. Residents in all four communities are also concerned about the impact of growth and development on their access to municipal drinking water in the coming years.

As we noted in the introduction, we encourage people to share this report with others who they think are interested in issues related to drinking water in BC. We also welcome questions and feedback, which can be directed to Dr. Ilja Tromp-van Meerveld (ilja@sfu.ca) or Dr. Valorie Crooks (crooks@sfu.ca) in the Department of Geography at Simon Fraser University.

6. Acknowledgements

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