Evaluating Public Opinion on Groundwater Extraction from Public Comment Submissions and Google Trends

Simon Gautrey

Abstract

When hydrogeologists evaluate new groundwater takings, they frequently must consider whether such takings are in the public interest. This often means that hydrogeologists will consider public opinion in their evaluation. But how can hydrogeologists understand public opinion, when groundwater is rarely a subject of properly designed public opinion surveys? In lieu of survey data, hydrogeologists might turn to comments submitted as part of a formal environmental assessment process. However, hydrogeologists might suspect that these comments were submitted by only the most motivated individuals and may not reflect the views of the general public. This paper includes a study of thousands of public comments regarding bottled water takings in Ontario, which is arguably the largest recent groundwater conflict in Canada. The paper compares these results to data from Google Trends and other sources to evaluate how those comments might reflect opinions of the wider population. The results highlight the roles geographic proximity and droughts might play in forming public opinion.

Keywords

Public opinion • Google trends • Nestle • Nestlé • Groundwater • Bottled water

1 Introduction

Groundwater is rarely on the mind of the general public, but in 2016, an application by Nestlé Waters (Nestlé) to undertake a pumping test of a well in Ontario, Canada, for bottled water was followed by a frenzy of media interest. The government responded by proposing a moratorium of new takings for bottled water to which over 20,000 public comments were submitted. Public comments on subsequent government proposals to extend this moratorium in 2018 and 2019 each received more than 7,000 comments. To put this into perspective, the Inquiry into the Walkerton Tragedy, a water contamination event in the year 2000 in Ontario that resulted in the tragic death of seven persons, and serious illness befalling thousands of others, lists less than 200 public submissions (Walkerton Inquiry 2001). The purpose of this research is to seek insight into the value of these public comments concerning bottled water by comparison with publicly accessible data from Google Trends and other sources. This paper will not distinguish between the pros and cons of bottled water.

In 2019, there were 16 active permits for groundwater takings for bottled water in Ontario. Of these, Nestlé has the largest permitted allowance representing 45% of the total permitted allowance for bottled water in Ontario (MECP PTTW database).

Nestlé has two well supplies for bottled water in Ontario near Guelph, one at Aberfoyle and the other at Erin. Both Guelph and Erin are communities dependent on groundwater for drinking water. According to the annual reports prepared by their consultants in 2019, Nestlé took an average of 822,581 m^3/year in the previous 5 years, although this decreased to 746,352 m^3/year in 2018 (Golder 2019a, b).

2 Data Sources and Methods

The data used in this study comes from public databases and websites from the following: Ontario Ministry of Environment, Conservation and Parks (MECP); the MECP Environmental Registry of Ontario (ERO, formerly Environmental Bill of Rights (EBR)); Nestlé; and Google Trends.

S. Gautrey (✉)
Wood Environment and Infrastructure Solutions, Hamilton, ON, Canada
e-mail: simon.gautrey@woodplc.com

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The MECP is the government body responsible for regulating groundwater taking in Ontario. The ERO website describes the proposed moratorium and provides access to public comments submitted online about proposals. A first proposal for a two-year moratorium was posted for public comment in 2016. Further proposals to extend the moratorium were posted in 2018 and 2019. Table 1 summarizes the number of comments received for these proposals. The last moratorium discussed in this paper expired on October 1, 2020.

Only comments visible online were used in this study. Comments from the 2016 proposal were previously analyzed by Gautrey (2017). Gautrey (2017) randomly selected 377 comments as a representative sample and analyzed the sample for common themes. The sample size was selected using a confidence level of 95% and a confidence interval 5, using the entire 21,276 comments received as the population size, but only analyzing the available online comments.

Comments from the moratorium extensions in 2018 and 2019 were analyzed using a similar methodology to Gautrey (2017). However, the population size was reduced to online comments only, and the confidence interval increased to 10. The sample size of randomly selected comments for both the 2018 and 2019 proposals was 81.

In addition to the analysis of randomly selected comments for common themes, the database of all accessible online comments for the 2018 and 2019 proposals was searched for popular words.

Google Trends is an online tool by Google which can generate data on the frequency and location of Google searches by search term. Gautrey (2017) identified several search terms for the 2016 moratorium, and these same terms were used here. Google Trends provides relative interest data, with the most common search term assigned a value of 100 at the time of the most searches for that term, and other terms rated in proportion to that search.

Table 1 Summary of comments received on government ERO webpage for moratorium

ERO (or EBR) number (and reference)	Comment closure date and comment period length	Number of comments received:		
		Online	In writing[a]	In total
012-8783 (EBR 012-8783) Initial 2-year moratorium	December 1, 2016, after 45 days	8156	13120	21276
013-3974 (ERO 013-3974) First (1-year) extension	November 28, 2018, after 30 days	537[b]	6412	6949
019–0913 (ERO 019–0913) Second (9-month) extension	December 18, 2019, after 30 days	598[c]	8105	8703

[a]Either by mail or email for 012-08783, and email only for 13-3974 and 19-0913
[b]Only 527 could be viewed online, of which 518 are comments by individuals, not organizations
[c]Only 505 could be viewed online, of which 496 are comments by individuals, not organizations

Table 2 Analysis of most common themes expressed in comments on moratorium proposals

Theme	2016 Moratorium (%)	2018 extension (%)	2019 extension (%)
Supported moratorium to water takings for bottled water for any reason	98.1	98.8	100.0
Concerned about the plastic waste	15.6	39.0	33.3
Opposed to the sale of water for profit	40.4	36.6	21.0
Concern about water availability for future generations	9.4	23.2	9.9
Supported increasing the cost of water taken by bottled water companies	11.6	20.7	17.3
Prioritize water takings for local communities (including agricultural)	14.8	18.3	12.3
Opposed to private ownership of water on basis of access to water as a human right	17.3	17.1	17.3
Concerned about climate change	5.1	9.8	12.3
Concerned about drought or the threat to stressed aquifers from the perceived large magnitude of the taking	13.2	8.5	6.5
Prioritize water for the environment	4.0	3.7	1.2

3 Results

3.1 Analysis of Comments Submitted to the Government Regulator (MECP)

The results of the analysis of the comments grouped into common themes is summarized in Table 2. Very few comments opposed the moratorium. The most common reasons for supporting the moratorium were opposition to the sale of water for profit and the generation of plastic waste. From 2016 to 2019, there is an apparent increase of interest in: plastic waste; availability of water for future generations; a desire to see companies pay more for the water they take; and climate change. There also appeared to be a decrease in concern about drought impacts or stressed aquifers.

The recognition of a theme in a comment is partly qualitative, and to validate the assignment of comments to theme from the samples, the entire set of 2018 and 2019 online comments was ranked by common words related to the themes (Table 3). These results are generally similar to the rankings of themes, with plastic, profit, future and climate as commonly identified words that might indicate an interest in the theme topics. Other identified common words were corporation and environment.

3.2 Analysis of Google Trends Data

A Google Trends dataset from 2015 to 2020 was queried for frequency of search term results that might be associated with the bottled water moratorium, based on previous work (Gautrey 2017), plus the term groundwater (Fig. 1). Only Google searches originating from Ontario were queried. Results indicate that the greatest interest was in the term Nestlé, occurring the late summer of 2016, during a period when the terms drought and water ban were also more frequently searched than at other times. The results for search term Nestlé were also queried for the origin location of the searches (Table 4). Guelph, a large population center located immediately north of Nestlé's main water bottling plant in Aberfoyle was the most common origin of searches for the word Nestlé.

4 Discussion

The datasets collected could be analyzed various ways. The Google Trends data indicates a strong interest in Nestlé in 2016, which was immediately prior to the MECP's first request for comment on the moratorium, when media interest in Nestlé's bottled water operation was high following Nestlé's announcement to buy a well that the local municipality had expressed interest. This was also a drought summer.

Most searches for Nestlé originate from Guelph, which is a community dependent on groundwater and close to Aberfoyle where Nestlé obtains much of its water. Other nearby communities also score highly when the search results are normalized on a per capita basis. These results are interpreted to suggest that the conflict over bottled water is a local issue and in 2016, exacerbated by drought conditions that summer.

Since 2016, the interest of the commenting public appears to shift to a greater interest in plastic waste, concern about water for future generations, making bottled water companies pay more for water, prioritizing water for local communities, and climate change.

Table 3 Frequency of words as percentage of all available downloaded comments

Word	2018 extension (%)	2019 extension (%)	Average (%)
Plastic	29.3	32.3	30.8
Nestlé (or Nestle)	25.2	36.0	30.4
Profit	28.2	26.7	27.5
Corporate or corporation	22.7	22.7	22.7
Environment	22.3	22.9	22.6
Groundwater	17.8	23.7	20.6
Future (as in future generations)	18.0	15.0	16.5
Climate	8.5	12.8	10.6
Aquifer	8.3	7.3	7.8
Finite (as infinite resource)	6.6	7.5	7.0
Policy	3.6	8.9	6.2
Drought	6.4	4.0	5.3
Human right	3.2	6.7	4.9
Regulation	4.2	5.3	4.7
Research	4.2	2.0	3.1

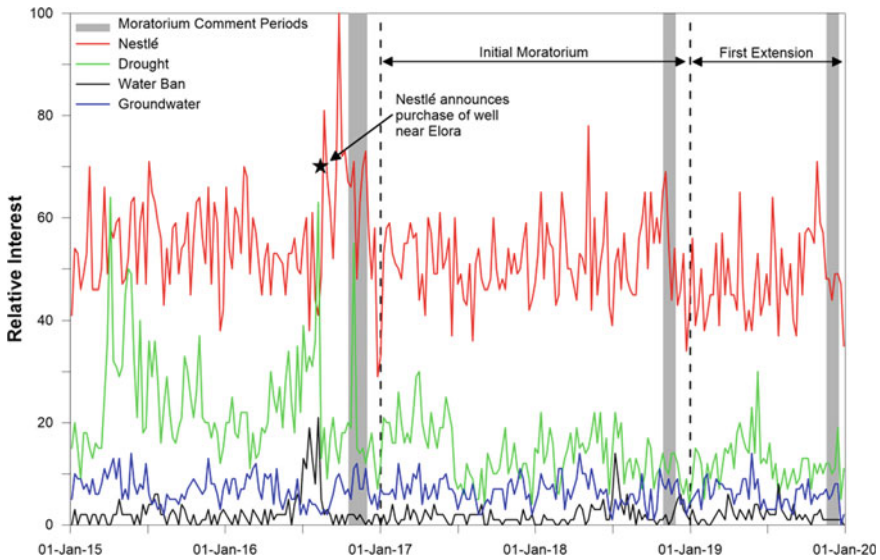

Fig. 1 Google Trends relative interest results for searches from Ontario (2015–2019)

Table 4 Origin location of Google searches for "Nestlé" (2015 to 2020 results)

City of origin for search as recorded by Google Trends	Dominant municipal water source	Google relative interest score (0 to 100)	Google maps driving distance from Aberfoyle (km)	Google maps approximate mid-day driving time from Aberfoyle (minutes)	Population 2016 Canada census data[1]	Google score normalized to Guelph on a per capita basis
Guelph	Groundwater	100	13.8	16–30	132,000	100.0
Brampton	Great Lakes	96	56.2	35–45	594,000	21.3
Mississauga	Great Lakes	87	55.7	35–50	722,000	15.9
London	Great Lakes	85	123	70–100	384,000	29.2
Vaughan	Great Lakes	80	77	45–105	306,000	34.5
Milton	Great Lakes	77	27	18–30	110,000	92.4
Markham	Great Lakes	76	88	50–65	329,000	30.5
Richmond Hill	Great Lakes	75	103	50–70	195,000	50.8
Cambridge	Groundwater	72	25	26–35	130,000	73.1
Toronto	Great Lakes	71	78	50–75	2,730,000	3.4

[1]Statistics Canada website. Census boundaries may not align with Google Trend areas

5 Concluding Remarks

The results of this work indicate that public interest in Nestlé's bottled water operations in Ontario varies with both events (increasing after droughts or unpopular actions by the proponent) and location (local is important, with public interest appearing to decrease with distance from the Nestlé sites). Furthermore, analysis of public comments over time shows that the commenting public are more likely to mention general environmental issues such as plastic waste or non-groundwater issues such as profit than to mention groundwater, with the relative interest in individual concerns changing slightly over time.

The drawing of conclusions about public interest in groundwater is typically stymied by a lack of data. The results of this work indicate the potential usefulness of the tools available with Google Trends for analysis of public opinion on groundwater issues, providing context not only on the timing of public interest, but also general location of the commentators. These tools open a potential new avenue for researchers interested in groundwater conflict. However, the approach might only be useful where public interest is both large enough and sufficiently focused to be

recognizable above the "noise" of everyday web search activity, and in locations where the public has ready access to the Internet.

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