The Poop Scoop: Victoria's Sewage Problem

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Introduction

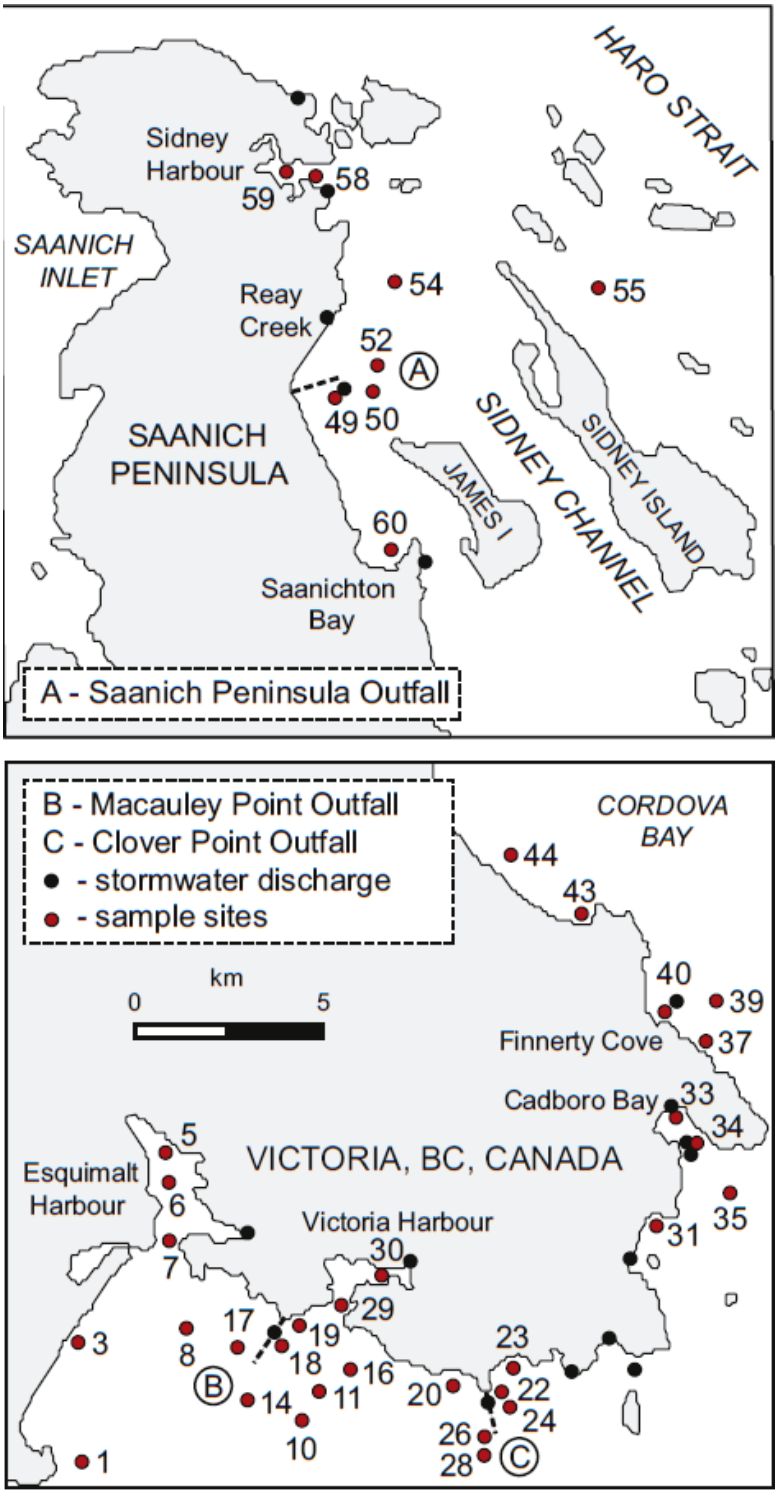
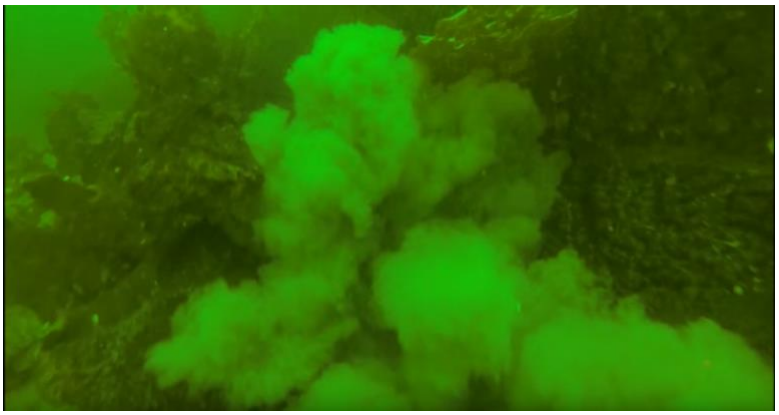


Figure 1. Map of Krepakevich & Pospelova's (2010) study area showing sample site locations in relation to the three sewage outfall stations, labelled A, B, and C.

Victoria, the capital of British Columbia, is currently working through a wicked problem involving their sewage system which has been dumping raw sewage into the waters off the coast of Victoria for over 100 years. There are three outfall pipes discharging preliminary

treated sewage into the ocean (Berman, 2015), which means it is simply screened of large solids and not treated in any way (Pescod, 1992).

This lack of treatment has led to much discontent within Victoria and in other regional areas, such as Washington State, USA. Many stakeholders believe that a new sewage treatment plant must be built to treat Victoria's sewage waste, and others add that this treatment facility should perform tertiary treatment rather than only secondary treatment of the sewage discharge (Berman, 2015; Pescod, 1992). Among proponents for the plant are local citizens, scientists, environmentalists, as well as governments at federal and provincial levels. Many people disagree on the level of impact that this untreated sewage discharge has on local waters. Some say the environment is largely unaffected (e.g. Chapman, 2009), while others point to the excessive sedimentation in the waters around the discharge outflow pipes (e.g. Skwarok, 2013). The effect that this nutrient rich discharge may have on the environment is under scientific investigation. Krepakevich and Pospelova (2010) show that discharge near the two preliminary-treated sewage outflows (labelled "B" and "C" on the bottom map in Figure 1) are correlated with elevated levels of species indicative of eutrophication. Where the wastewater discharge underwent secondary treatment (labelled "A" on the top map in Figure 1), these species were not prevalent. Toxic species were also present near all outflows (Krepakevich & Pospelova, 2010).



Skwarok, 2013

In the images below you can see screenshots of a local scuba diver's video of the underwater environment (Skwarok, 2013). The top image was taken more than five kilometers away from the Macauley Point outfall and the bottom image was taken 35 km west of these waters. These two images show a clear difference in sedimentation in the two areas.

Framing the Problem

This is a wicked problem since there are a variety of stakeholders involved, a significant number of scientific uncertainties, and a lack of clear governance around this situation. The stakeholders and various interactions and environmental effects are summarized in the mind map in Figure 2.

This issue does not solely involve the residents of Victoria but many others as well. The waste water that is discharged flows out into Juan de Fuca strait, and this brings in an international stakeholder. The local waters off Victoria connect down the coast to the Juan de Fuca Islands in Washington State. Many inhabitants of this area feel as though Victoria is ignoring their valid concerns and need to clean up their act (Berman, 2015). Both the national and provincial governments have asked Victoria to come up with a solution and have offered to help pay for construction of a sewage treatment plant. The municipal governments on the other hand once claimed that tertiary treatment is much too expensive and not necessary. Several local groups have also been involved in the debate, arguing over where to site a plant, the costs of a plant, as well as the necessity of a plant (Berman, 2015).

Secondly the level of knowledge around the effects of dumping raw sewage into the waters of Victoria is debated. There have been few studies conducted into this area and those done show conflicting results. Some results show that bacteria present exceed maximum allowable levels (Berman, 2015). However what is not known are the levels of eutrophication and oxygen depletion happening as a result. Also unknown are the possible effects on wildlife and how far the contaminants present in the wastewater discharged may be travelling down the coast. However, *Krepakevich and* Pospelova (2010) have determined that the spread of environmental effects is farther than has been previously claimed.

A third issue is the muddled governance around water and wastewater in Canada. The laws governing water quality in Canada as well as sewage treatment are primarily controlled on a municipal level. The federal government largely leaves water control in the hands of the provinces. British Columbia in turn allows municipalities to decide how to treat their wastewater, with only basic minimum standards to be met (BC Ministry of Environment, 2013). However due to a lack of knowledge around the effects of dumping raw sewage it is unknown as to whether or not this is resulting in significant environmental impacts.

Overall, this problem is wicked for three main reasons. First, there are a large number of stakeholders involved and affected by the problem. Second, the level of certainty surrounding the problem is low, thus causing complications and complexities. Finally, there is a lack of clarity in the relevant governance structures and regulations. Overall, this wicked problem is complicated, but further resarch and cooperation may elucidate the appropriate steps to be taken.

In the case study of Victoria's sewage, the only way this situation can be solved is if final, concrete decisions are made. Therefore, key decision-makers and the governance of these decisions are extremely important. As this dilemma only pertains to a small part of Canada, there are no global or international regulations/agreements that discuss sewage treatment. There are international agreements between Canada and the United States; however, these only consider international bodies of water that flow between the two countries.

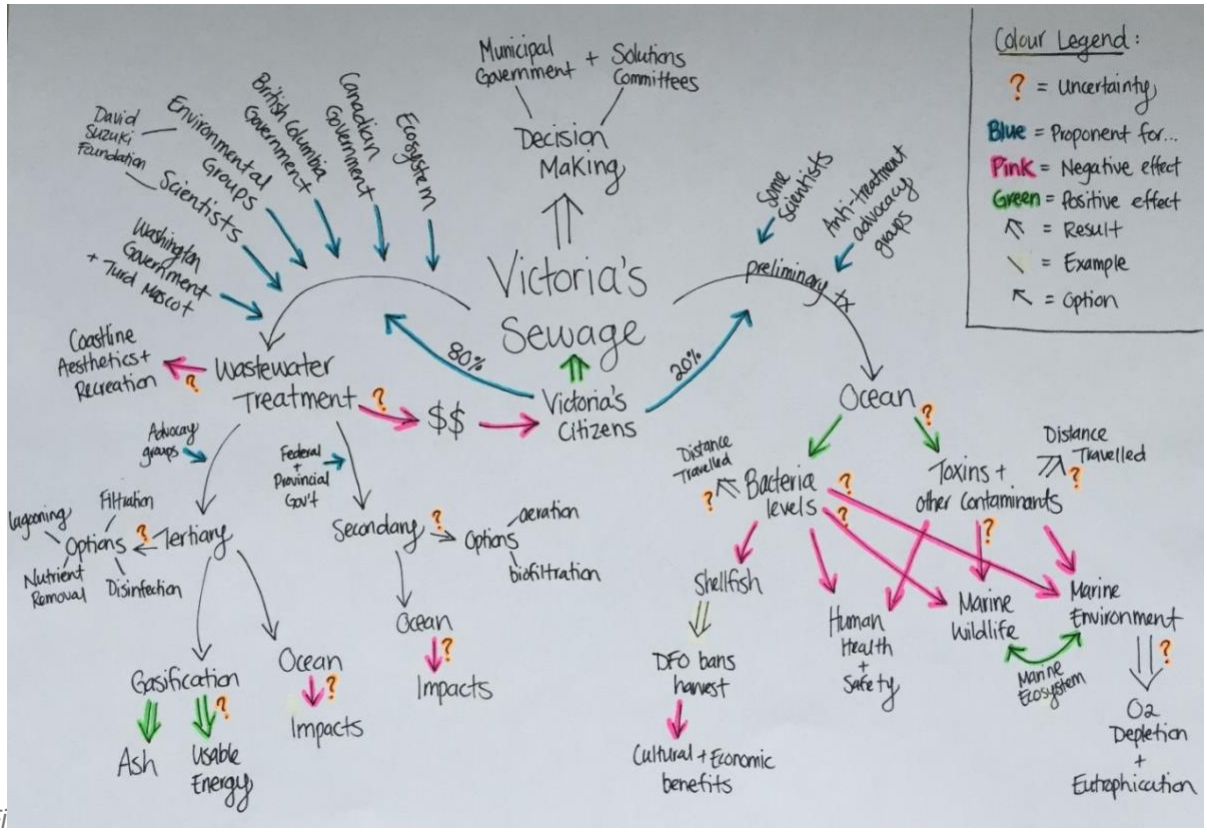


Figure 2. A mind map outlining the complexities of Victoria's sewage problem, including the many stakeholders as well as various interactions and environmental effects.

Governance Framework

On the Canadian federal level, sewage treatment regulations are vague when considering specific areas, as most water regulations discuss water quality such as the *Canada Water Act* (Environment Canada, 2015). However, on the federal scale, the *Fisheries Act* is the most useful when considering Victoria's issue. In this act, section 36, subsection 3 states that "no person shall deposit or permit the deposit of a deleterious substance of any type in water frequented by fish or in any place under any conditions where the deleterious substance or any other deleterious substance that results from the deposit of the deleterious substance may enter any such water" (Fisheries Act, 1985). In the Wastewater Systems Effluent Regulations (WSER) which falls under the *Fisheries Act*, the legally required levels that must be maintained are a maximum of 25 mg/L of carbonaceous biochemical oxygen demand and 25 mg/L of suspended solids (Wastewater Systems Effluent Regulations, 2012). Both of these parameters were significantly exceeded at both wastewater outfalls in Victoria in 2013 (CRD, 2014). Thus, according to the WSER, the CRD is required to upgrade to at least secondary wastewater treatment by 2020 (Wastewater Systems Effluent Regulations, 2012).

However, enforcing more specific regulations is difficult to do from the federal level, thus the majority of laws and regulations are finalized by the provincial governments. In British Columbia, wastewater is regulated through the Municipal Wastewater Regulation, which

maps out guidelines that all municipalities must follow in regards to wastewater treatment and discharge. However, only minimum standards are set out (BC Ministry of Environment, 2013), thus the most influential decision-makers lie within the board of the Canadian Regional District (CRD) which centres in Victoria.

The governance framework of this situation is of course extremely important, however, equally as crucial is having decision makers be open about the processes of what is going on and having information available to the public. With all things considered in relation to Victoria's sewage, the CRD has shown good governance in terms of transparency, accountability, and participation, which are important components of responsible governance (Darby, 2010). The CRD board has taken the liberty of appointing a Fairness and Transparency Advisor to work independently from the board, has included public consultation in the decision making process, and has made some information available online for the general public (CRD, 2015). However, this information can sometimes be hard to understand and difficult to find. Furthermore, in tandem with the many official documents being published online, there are many unofficial sites giving voice to the these issues. While it is beneficial to allow open participation in the relevant discussions, this risks leading people to ill-informed conclusions about what is going on. Overall, the CRD has done a fairly good job in the areas of transparency, accountability, and participation in providing information about their planning process online, in their dedication to upgrade their wastewater treatment system, and in their willingness to consult with the general public throughout the decision making process (CRD, 2015).

Moving Forward

Some of the important considerations for the planning process that the CRD is currently undergoing include the level of wastewater treatment implemented, the number of treatment plants, and the locations of these plants. The CRD is currently investigating tertiary wastewater treatment options (CRD, 2015), which demonstrates their commitment to the interests of the general public as well as the environment (Berman, 2015). Given the current level of scientific knowledge, as limited as it is, tertiary treatment is likely required to mitigate long term environmental effects since toxic species were present even near a local secondary treatment outfall (labelled "A" in Figure 1) (*Krepakevich &* Pospelova, 2010).

The number of treatment plants, potentially ranging from one to seven (CRD, 2015), should be enough so that all environmental impacts will be mitigated now and in the future, even in case of significant population growth. However, this likely can only be determined via comprehensive and unbiased environmental research as well as continuous environmental assessments of the same nature. Therefore, the CRD should ask that Environment Canada or a non-biased third party carry out research studies as well as frequent environmental assessments before, during, and after treatment implementation. Initially, more comprehensive research studies will help clarify the issues involved, thus guiding the decision making process. Additionally, continuous assessments during and after implementation will help to ensure the selected treatment options are effective and efficient in the short and long term. Lastly, the scientific knowledge gained from all of these studies and assessments will provide valuable information for the general scientific community. Since Victoria is not the only city dumping raw sewage into the ocean, future applications for such scientific knowledge are likely.

Lastly, the location of the treatment plants, as well as many other issues involved, are a concern for many citizens (Berman, 2015). Ideally, the CRD will consider the opinions of the general public even after the public consultation phase is complete. Efforts should be taken to ensure that the interests of the general public are fairly considered when making the ultimate decision. This should be an important concern for the appointed Fairness and Transparency Advisor. Additionally, the CRD must make sure the information they are sharing is easily accessible, well organized, thorough, and detailed. While they provide a significant amount of information available online (CRD, 2015), improvements can be made to further increase their level of transparency, and thus the ability for the general public to develop and communicate informed opinions throughout the wastewater treatment planning and decision-making process.

The primary short-term goal behind the above recommendations is to ensure that the interests of all stakeholders involved, including those of the environment and local wildlife, are honoured while Victoria finds and implements a solution to this wicked problem. However, one suggestion for a long-term goal could be to create a Pacific Northwest (PNW) regional agreement around the management and conservation of PNW aquatic systems. Such an agreement would be implemented through long-term and thorough discussion between all stakeholders in the PNW region and would consider all current federal, provincial, and state regulations. This level of regional participation and cooperation, including the sharing and integration of scientific knowledge, may help to minimize cumulative environmental impacts as well as ensure the accountability and transparency of local decision makers. Ultimately this could improve public trust and satisfaction with governance frameworks and would likely help to improve the health and sustainability of both PNW social systems and aquatic ecosystems.

References

The following is an exhaustive list of the sources used to develop the above opinions and recommendations regarding Victoria's sewage problem. Some are annotated and some were also referenced in the above report.

Berman, S. (2015, January 26). Victoria's secret: Dumping raw sewage like it's 1915. Retrieved from The Tyee website: thetyee.ca/News/2015/01/26/Victoria-Raw-Sewage-Dumping/

BC Ministry of Environment. (2013). Reclaimed Water Guideline. A Companion Document to the Municipal Wastewater Regulation Made Under the *Environmental Management Act*. Retrieved from http://www2.gov.bc.ca/gov/content/environment/waste-management/sewage/municipal-wastewater-regulation

Chapman, P. M. (2009). Science, politics and ideology – The Victoria (BC, Canada) sewage issue. *Marine Pollution Bulletin*, *52*, 719-721.

CRD (Capital Regional District). (2014). Macaulay and Clover Points, Wastewater and Marine Environment Program, 2013 Annual Report. Retrieved from https://www.crd.bc.ca/docs/default-source/crd-document-library/annual-reports/environmental-protection/wastewater-marine-environment/macaulay-clover-points/macaulay-and-clover-points-annual-report.pdf?sfvrsn=10

CRD (Capital Regional District). (2015). Wastewater Planning. Retrieved from https://www.crd.bc.ca/project/wastewater-planning

Darby, S. (2010). Natural resource governance: New frontiers in transparency and accountability. London. Retrieved from http://www.transparency-initiative.org/reports/natural-resource-governance-new-frontiers-in-transparency-and-accountability

Environment Canada. (2015). *Water governance and legislation. Federal policy and legislation.* Retrieved from https://www.ec.gc.ca/eau-water/default.asp?lang=En&n=E05A7F81-1

Fisheries Act, R.S.C., c. F-14. (1985). Retrieved from http://laws-lois.justice.gc.ca/PDF/F-14.pdf

Hipolito, C. (2012). Local activist James Swarok, also known as Mr. Floatie, dips his boot into the water near Clover Point in Victoria in November 2012 [Photo]. The Canadian Press. Retrieved from http://www.theglobeandmail.com/news/british-columbia/victoria-sewer-dispute-hits-the-fan-as-washington-state-urges-bc-intervene/article19131685/

Krepakevich, A., & Pospelova, V. (2010). Tracing the influence of sewage discharge on coastal bays of southern Vancouver Island (BC, Canada) using sedimentary records of phytoplankton. *Continental Shelf Research*, *30*, 1924-1940.

Pescod, M. B. (1992). Wastewater treatment. In *Wastewater treatment and use in agriculture*. Food and Agriculture Organization of the United Nations, Rome. Available at www.fao.org/docrep/t0551e/t0551e05.htm

Skwarok, J. (2013). CRD sewage outfall pollution in Victoria, BC [Video file]. Retrieved from youtu.be/hNR1dfcJn30

Wastewater Systems Effluent Regulations, SOR/2012-139. (2012). Retrieved from http://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-139/FullText.html

Peer-Reviewed Sources

Altomare, J. (1991). Stemming the flow: The role of international environmental law in seeking a solution to the sewage treatment crisis at the Tijuana – San Diego border region. *California Western International Law Journal*, *21*, 361-421.

This peer reviewed article gives an in-depth overview of the sewage treatment situation which is that of raw sewage spilling into the Tijuana River that travels across the United States border into San Diego. This is a very beneficial resource for my research as it shares some similarities between what is happening between Victoria and the United States in Washington. As it goes very in-depth, it is great for detail but also difficult to understand the basics of the situation and the main conclusion of what will/should happen is unclear. Of course this problem is also a wicked problem therefore it has no clear and simple solution. It would have been ideal if this situation had been resolved so that Victoria and Washington would have a successful example to follow.

Brisolara, K.F., Qi, Y. (2015). Biosolids and sludge management. *Water Environment Research*, *87*, 1147-1166.

This is a review of several articles present in the literature on biosolids and sludge management. The authors look at the literature available on waste treatment breaking them down by categories. The categories are, biosolids regulations and management issues; biosolids characteristics, quality and measurement including microconstituents and pathogens, sludge treatment technologies including pretreatment and sludge minimization, conditioning and dewatering, digestion, composting and innovative technologies; disposal and reuse including combustion/ incineration, land application and non- agricultural use; odor and air emissions; as well as energy issues. This provides an excellent review and summation of available peer reviewed literature on the subjects mentioned. All the information provided gives a broad over view of the best methods available for treatment and what could be potential applications for the situation in Victoria. This article was published by the journal Water Environment Research.

Caporgno, M.P., Trobajo, R., Caiola, N., Ibanez, C., Fabregat, A., Bengoa, C. (2015). Biogas production from sewage sludge and microalgae co-digestion under mesophilic and thermophilic conditions*. Journal of Cleaner Production*, *75,* 374-380.

Chapman, P. (2006). Science, Politics and Ideology – The Victoria (BC, Canada) Sewage Issue. *Marine Pollution Bulletin*, *52*, 719-721.

This journal article presents a strongly opposing scientific argument, from the personal perspective of a previous Coastal Regional District (CRD) sewage researcher, to Victoria's sewage having damaging human and ecological health effects. It describes primarily mineral contamination studies, suggesting that although concentrations previously exceeded safe levels, they had been subsequently reduced within set parameters. The article also provides a geographic summary of the problem, both physical and human. The social nature of the problem is portrayed as arguments between citizen values – one side supporting treatment for aesthetic, moral concerns, and the other opposing for science-based, economic reasons. It further describes how emotion has disturbed the objectivity of scientific decision-making, both sides strongly advocating only their own factual data.

In credibility, a number of references are cited, although some perhaps less relevant through the passing time and the dynamic nature of this problem. However, this resource appears quite useful in examining the social atmosphere surrounding this issue – essentially quite contentious and stuck in the mismatching of values and scientific uncertainty. A major weakness against the reliability of this paper though is its strong, unbalanced argument. For example, it argues firmly against the sewage having noticeable human health impacts, but gives less consideration to its environmental impacts and also limitations in the scientific data collection process.

Chapman, P. (2008). Sewage treatment wasted – The Victoria (BC, Canada) Example. *Marine Pollution Bulletin*, *56*, 1815-1816.

Clarke, B., & Smith, S. (2011). Review of 'emerging' organic contaminants in biosolids and assessment of international research priorities for the agricultural use of biosolids. *Environment International*, *37*, 226-247.

Darby, S. (2010). Natural Resource Governance: New frontiers in transparency and accountability. Retrieved from http://www.transparency-initiative.org/reports/natural-resource governance-new-frontiers-in-transparency-and-accountability

Goto, N., Hu, H-Y., Lim, B-R., & Fujie, K. (2001). Analysis of material and energy flow in sewage treatment facilities in Japan. *Environmental Technology*, *22*, 487-496.

Krepakevich, A., & Pospelova, V. (2010). Tracing the influence of sewage discharge on coastal bays of southern Vancouver Island (BC, Canada) using sedimentary records of phytoplankton. *Continental Shelf Research*, *30*, 1924-1940.

Nunes, B., Capela, C., Sergio, T., Caldeira, C., Goncalves, F., & Correia, T. (2014). Effects of chronic exposure to lead, copper, zinc, and cadmium on biomarkers of the European eel, *Anguilla anguilla*. *Environmental Science and Pollution Research International*, *21*, 5689-5700.

Roth, W., Riecken, J., Pozzer-Ardenghi, L., McMillian, R., Storr, B., Tait, D., & Penner, T. (2004). Those who get hurt aren't always being heard: scientist – resident interactions over community water. *Science, Technology, & Human Values*, *29*, 153-183.

Singh, K. P., Mohan, D., Sinha, S., & Dalwani, R. (2004). Impact assessment of treated/untreated wastewater toxicants discharged by sewage treatment plants on health, agricultural, and environmental quality in the wastewater disposal area. *Chemosphere*, *55*, 227-255.

Zhang, X.H., Wei, Y., Pan, H.Y., Xiao, H., Wu, J., Zhang, Y.Z. (2015). The comparison of performances of a sewage treatment system before and after implementing the cleaner production measure*. Journal of Cleaner Production*, *91*, 216-228.

Zhao, Y., Qin, Y., Chen, B., Zhao, X., Li, Y., Yin, X., & Chen, G. (2009). GIS-based optimization for the locations of sewage treatment plants and sewage outfalls – a case study of Nansha district in Guangzhou City, China. *Communications in Nonlinear Science and Numerical Simulation*, *14*, 1746-1757.

This peer reviewed article examines a case study in China (Nansha District in Guangzhou City) which with the help of GIS, considers the best locations for sewage treatment facilities while factoring in social, economic, and ecological issues. This gives good insight into thoroughly thinking through where it could be placed when considering multiple factors. Through mathematical calculations, it is shown in this case study where suitable, partially suitable, and unsuitable places facilities could be placed. Finding a location for the potential Victoria facility will be difficult, but with new technologies like discussed in this article, it should hopefully make decision making a bit easier.

Government Sources

BC Ministry of Environment. (2013). Reclaimed Water Guideline. A Companion Document to the Municipal Wastewater Regulation. *Environmental Management Act*. Retrieved from http://www2.gov.bc.ca/gov/content/environment/waste-management/sewage/municipal-wastewater-regulation

CRD (Capital Regional District). (2014). Macaulay and Clover Points, Wastewater and Marine Environment Program, *2013 Annual Report.* Retrieved from https://www.crd.bc.ca/docs/default-source/crd-document-library/annual-reports/environmental-protection/wastewater-marine-environment/macaulay-clover-points/macaulay-and-clover-points-annual-report.pdf?sfvrsn=10

CRD (Capital Regional District). (2015a). *Wastewater Planning*. Retrieved from www.crd.bc.ca/project/wastewater-planning

CRD (Capital Regional District). (2015b). *Regional Source Control*. Retrieved from www.crd.bc.ca/about/what-we-do/sewers-wastewater-septic/regional-source-control

CRD (Capital Regional District). (2015c). *Eastside Wastewater Dialogues,* Retrieved from https://www.crd.bc.ca/docs/default-source/Wastewater-Planning-2014/crd-news-oct2015-lt.pdf?sfvrsn=2

Environment Canada. (2015). *Federal Policy and Legislation, Water Governance and Legislation*. Retrieved from https://www.ec.gc.ca/eauwater/default.asp?lang=En&n=E05A7F81-1

Fisheries Act, R.S.C., c. F-14. (1985). Retrieved from http://laws-lois.justice.gc.ca/PDF/F-14.pdf

Fisheries and Oceans Canada. (2015). *Fishery Notice*. Retrieved from http://www-ops2.pac.dfo-mpo.gc.ca/fns-sap/index-eng.cfm?pg=view_notice&lang=en&ID=recreational&ispsp=1

This Fishery Notice on the Fisheries and Oceans Canada website lists all the areas along coastal BC where seafood harvesting is banned. In the areas around Victoria (19-3 and 19-4) the harvesting of all types of bivalve shellfish is banned.

This piece of information is valuable in that it provides evidence of one of the negative environmental impacts that Victoria's sewage discharge has had. This is a result of increased levels of bacteria. Given that the bacteria levels of the wastewater being discharged have continuously exceeded guidelines, this causal relationship is highly likely and few may dispute it.

Government of British Columbia. (2015a). *Liquid Waste Management Plans.*Retrieved from http://www2.gov.bc.ca/gov/content/environment/waste-management/sewage/liquid-waste-management-plans

Government of British Columbia. (2015b). *Water Sustainability Act*. Retrieved from http://engage.gov.bc.ca/watersustainabilityact/

Government of Canada. (2015c). *Canada Water Act*. Retrieved from http://laws-lois.justice.gc.ca/eng/acts/C-11/index.html

Government of Canada. (2015d). *International Boundary Waters Treaty Act*. Retrieved from http://laws-lois.justice.gc.ca/eng/acts/I-17/index.html

Government of Canada. (2015e). *International River Improvements Act*. Retrieved from http://laws.justice.gc.ca/eng/acts/I-20/index.html

Haggarty, D. R., McCorquodale, B., Johannessen, D. I., Levings, C. D., & Ross, P. S. (2003). *Marine environmental quality in the central coast of British Columbia, Canada: a review of contaminant sources, types and risks*. Retrieved from Fisheries and Oceans Canada website: www.dfo-mpo.gc.ca/Library/278588.pdf

This Fisheries and Oceans Canada report explains that sewage contributes to five types of pollution problems: bacteriological-viral contaminants; bio-chemical oxygen demand; organic solids deposition; nutrient enrichment; and other chemical contamination. Bacteria

and viruses found in sewage are health risks for both wildlife and humans, and are also the reason shellfish harvesting can be banned.

In areas with high currents, chemical contamination is one of the major issues as other issues can be lessened due to dispersal. Wastewater contains metals, synthetic organic chemicals, chlorine, solvents, oils, bleaches, and pharmaceuticals. Apparently, the highest levels of zinc, mercury, and copper are found in mollusks around Victoria sewage outfalls. Harmful organic chemicals can persist in the environment and accumulate in aquatic animals. Chlorine, which can be found in various cleaning products, is toxic to many aquatic organisms. Endocrine disruption has been found to result from some of the contaminants found in household products. Lastly, pharmaceuticals and natural or artificial hormones will enter the sewer system from human wastes and contaminate waterways.

This report is helpful in outlining the various chemical components that can contaminate aquatic systems due to wastewater discharge. However, further research is needed to determine what the effects of these contaminants can be and how much of a risk they are for the environment. Furthermore, this report is fairly outdated, as it is published in 2003.

International Boundary Waters Treaty Act, R.S.C., c. I-17. (1985). Retrieved from http://laws-lois.justice.gc.ca/PDF/I-17.pdf

International River Improvements Act, R.S.C., c. I-20. (1985). Retrieved from http://laws-lois.justice.gc.ca/PDF/I-20.pdf

Rankin, C. (2010). *Municipal Sewage Regulations Intentions Paper: Summary of Public Comments*. Victoria, BC: Ministry of Environment. Retrieved from http://www.env.gov.bc.ca/epd/codes/msr/pdf/msr-comments.pdf

Statistics Canada. (2013). *Human Activity and the Environment: Section 4 – Wastewater Discharges.* Retrieved from http://www.statcan.gc.ca/pub/16-201-x/2012000/part-partie4-eng.htm

United States Environmental Protection Agency. (2014). *Water Permitting (NPDES): Secondary Treatment Standards.* Retrieved from http://water.epa.gov/polwaste/npdes/Secondary-Treatment-Standards.cfm

Wastewater Systems Effluent Regulations, SOR/2012-139. (2012). Retrieved from http://laws-lois.justice.gc.ca/eng/regulations/SOR-2012-139/FullText.html

Popular Media Sources

Berman, S. (2015, January 26). *Victoria's secret: Dumping raw sewage like it's 1915*. Retrieved from The Tyee website: thetyee.ca/News/2015/01/26/Victoria-Raw-Sewage-Dumping/

This magazine article by the Tyee, written from a personal perspective and supported by scientific evidence, captures the overall key details and social relationships within the problem. Furthermore, it illustrates on the different stakeholders, linking greatly to the numerous interacting social, economic and political interests involved. It describes the historical and current situation – the ongoing planning towards determining how to implement the treatment.

References are not included, but information sources are often identified. The piece examines the different parts to the problem and presents background information, largely in

scientific facts, but also including a personal perspective towards supporting a sewage treatment facility. Overall, this article provides useful factual background into the problem and appears quite reliable. The argument is primarily one-sided, however, though this gives insight into the social media's views concerning the issue (at least some proportion supporting treatment).

Georgia Strait Alliance. (2005, September). *Victoria Sewage: Separating Myth from Fact.* Retrieved from http://georgiastrait.org/wp-content/uploads/Victoria-Forum-Transcript.pdf

Gordon, K. P. (2014, June). *Focus Online*. Retrieved from http://focusonline.ca/?q=node/735

Hopper, T. (2013, November 1). *Is a $783M Victoria Sewage Plant Necessary or the 'Largest Boondoggle in Canadian History'?* Retrieved from National Post website: http://news.nationalpost.com/news/canada/is-a-783m-victoria-sewage-plant-necessary-or-the-largest-boondoggle-in-canadian-history

Meissner, D. (2014, June 11). *Victoria Sewer Dispute Hits the Fan as Washington State Urges B.C. Intervene*. Retrieved from The Globe and Mail website: http://www.theglobeandmail.com/

Palmer, V. (2015, August 6). *Vaughn Palmer: Victoria's Royal Flush on Sewage Treatment Endures*. Retrieved from The Vancouver Sun website: www.vancouversun.com/news/Vaughn+Palmer+Victoria+royal+flush+sewage+treatment+endures/11271763/story.html

Sewage Victoria. (2015, September 22). *Weekly Sewage News Digest*. Retrieved from http://sewagevictoria.blogspot.ca/

Grey Literature Sources

ARESST (Association for Responsible Environmentally Sustainable Sewage Treatment). (2015). Retrieved from http://aresst.ca/

Georgia Strait Alliance. (2015). *Victoria Sewage Campaign.* Retrieved from http://georgiastrait.org/victoria-sewage-campaign/

LeBlanc, R., Matthews, P., & Richard, R. (2008). *Global Atlas of Excreta, Wastewater, Sludge, and Biosolids Management: Moving Forward the Sustainable and Welcome Uses of a Global Resource.* Nairobi, Kenya: United Nations Human Settlements Programme (UN-HABITAT).

Pescod, M. B. (1992). Wastewater Treatment. Wastewater Treatment and Use in Agriculture. Rome: Food and Agriculture Organization of the United Nations. Retrieved from www.fao.org/docrep/t0551e/t0551e05.htm

Responsible Sewage Treatment Victoria. (2012). *Misinformation and Bad Science*. Retrieved from http://www.rstv.ca/countering-misinformation-and/

As one of the major opposing-treatment Victoria citizen organizations, the Responsible Sewage Treatment Victoria (RSTV) in this online message provides a scientifically-based rebuttal to supporting-treatment scientific arguments, specifically of the Georgia Strait Alliance and T. Buck Suzuki Foundation (2011). It systematically rejects each section of the

report, particularly through its own facts, but also in economic and social values, providing a clear overview of the heated debate between the conflicting groups. Furthermore, it helps identify two other major opposing-treatment organizations: the Association for Responsible and Environmentally Sustainable Sewage Treatment (ARESST) and Sewage Victoria.

Although providing a definitely prime example of the significant controversy over the Victoria sewage problem, this article is highly unbalanced and with many fact sources unreferenced. This greatly diminishes the reliability of this resource for objective information. However, in terms of insight into the social nature of the problem, this article is quite valuable, featuring the depth of debate, as well as different groups' underlying social and economic motivations

Responsible Sewage Treatment Victoria. (2014). *Responsible Sewage Treatment Victoria*. Retrieved from http://www.rstv.ca/is-victoria-dumping-raw-sewage/

The RITE Plan. 2015. Here's how the RITE plan is designed. Retrieved from http://www.theriteplan.ca/4-what-is-the-solution.shtml

Victoria Sewage Treatment Alliance. (n.d.). *Basic Facts*. Retrieved from http://www.victoriasewagealliance.org/index_files/FactsVictoriaSewageAlliance.ht m

Warburton, R. (2014, May). Optics Trump Evidence: The Seaterra project in Victoria. *Public Sector Digest*. Retrieved from Responsible Sewage Treatment Victoria website: http://www.rstv.ca/optics-trump-evidence-the-seat/

Werring, J. 2013. It's Time to End the Sewage Treatment War in Victoria. Retrieved from David Suzuki Foundation website: www.davidsuzuki.org/blogs/healthy-oceans-blog/2013/12/its-time-to-end-the-sewage-treatment-war-in-victoria/

This online entry by the David Suzuki Foundation, an Environmental NGO, presents an alternative perspective to the problem – that sewage does have detrimental effects to human and ecological system health. It is written for the organization by a representative in an informal tone, advocating the need for increased environmental awareness and consideration. It implies more than 80% of Victoria citizens support treatment (although no citation). Fundamentally, the article argues secondary treatment of the city's sewage is long overdue and necessary for promoting human and ecosystem health.

Being an informal commentary, as a source of factual or objectively balanced evidence this article is less useful or reliable, but in terms of representing supporting-treatment group arguments and perspectives, this piece may be considered effective. Similarly advocating treatment arguments are likely supported amongst other environmental NGO organizations, and many citizen groups.

Raw Data Sources

Environment Canada. (2011). 2011 municipal water use report – municipal water use 2009 statistics. Retrieved from https://www.ec.gc.ca/doc/publications/eau-water/COM1454/survey8-eng.htm

City of Victoria. (2015). Sewer (whole network) [Data file, DWG]. Retrieved from http://www.victoria.ca/EN/main/city/open-data-catalogue.html

Environment Canada. (2011). Human Activity and the Environment. Table 4.3: Top ten substances released to water according to the National Pollutant Release Inventory, 2009. Retrieved from http://www.statcan.gc.ca/pub/16-201-x/2012000/t014-eng.htm

Georgia Strait Alliance & Sierra Legal Defence Fund. (2006). *To the CRD Scientific and Technical Review Panel: In the matter of the public review of liquid waste management issues in the core area*. Retrieved from http://www.victoriasewagealliance.org/SETAC_sub_GSA_SL.pdf

This report contains raw data (on p. 22) collected in 2003 by the CRD on the levels of chemical contaminants in the sediment at various distances from the Clover and Macaulay Point outfalls.

This data shows that copper exceeded both the BC Contaminated Sites Regulation (CSR) levels and the Council of Canadian Ministers of the Environment (CCME) probable effect levels (PEL) at both outfalls, including as far as 800 m away from the Macaulay Point outfall.

Almost all of the synthetic organic chemicals analysed exceeded both guidelines at both outfalls as well as at 100 m away from the Macaulay Point outfall; some of them also exceeded both guidelines at 800 m away from the Macaulay Point outfall.

The primary issue here is that the guidelines CRD uses are much more lenient than the CCME PEL and CSR guidelines. Therefore, environmental impacts may be occurring even though the CRD is not reporting risky levels of contaminants.

This raw data is very helpful as it identifies the primary chemical contaminants that come from Victoria's wastewater discharge. Unfortunately this data varies between years, and is collected 12 years ago; however, it serves as a good starting point for determining some of the past and possibly present environmental impacts of Victoria's wastewater discharge.

Markovic, D. (1995). *Untreated Municipal Sewage Discharge in Victoria Bight, British Columbia, Canada: An Investigation of Sediment Metal Contamination and Implications for Sustainable* [Master's thesis]. Retrieved from http://www.victoriasewagealliance.org/Markovic%20Heavy%20Metals.pdf

Peter, S. (2014). *Seaterra: Projected Cost Allocation Scenarios*. Victoria, BC: Canadian Taxpayers Federation. Retrieved from https://www.taxpayer.com/media/CTF-Seaterra-Report-edit%20PDF%20%28sh%20edits%29.pdf

United Nations Statistics Division. (2011). *Environmental Indicators – Inland Water Resources.* Percent of Population connected to wastewater collection/treatment. Retrieved from http://unstats.un.org/unsd/environment/wastewater.htm

Multimedia Source

Skwarok, J. (2013, August 11). CRD sewage outfall pollution in Victoria, BC [Video file]. Retrieved from youtu.be/hNR1dfcJn30

This video was created on July 17, 2013 by a SCUBA diver named Allan Crow who has been diving in the Victoria area for 35 years and is also a commercial fisherman. The video was recorded at a dive site more than 5 km away from the Macaulay Point outfall. It shows a greenish hue throughout the entire water column due to suspended particulates; a silt-covered rock bottom at 50 m depth; and one species of kelp as the only marine life in sight. Anecdotally, Crow remembers the same dive site 35 years ago being vibrant, colorful, and biologically diverse, which is far from what can be seen in this video. Apparently, this is what many dive sights in the area look like. Crow then shows a different dive site 35 km

west of Victoria where there is a bright blue tint, the water is clear of suspended particulates, and the marine live is diverse.

This video is not a reputable source for information since the diver could have been mistaken or even lied about the location of the dive site. Furthermore, the observations were not standardized or objective and were largely anecdotal. That being said, this video may provide observational data of the possible environmental effects of Victoria's wastewater discharge. Similar, but more standardized and objective environmental observations may be a highly valuable representation of the environmental effects of this discharge.

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