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Marine Pollution Bulletin 52 (2006) 719–721
MARINE POLLUTION BULLETIN
www.elsevier.com/locate/marpolbul

Editorial

Science, politics and ideology—The Victoria (BC, Canada) sewage issue

The City of Victoria (British Columbia, Canada) is part of the Capital Regional District (CRD). The CRD manages water and wastewater services for some 350,000 people in 13 municipalities and 3 electoral districts. Wastewater discharges from the City of Victoria enter the marine environment, the Strait of Juan de Fuca, at approximately 60-m depths via two long outfalls terminating in diffusers (the Clover and Macaulay Point Outfalls). The fact that the sewage is untreated other than by fine screening has become a "hot topic" in the popular press (locally, nationally and internationally), and for environmental groups and politicians (e.g., execute a Google search of "Victoria sewage").

I decided to write this editorial after a representative of an environmental group visited my home in North Vancouver one evening as part of a general canvassing effort seeking monetary and other support for various initiatives including "forcing the City of Victoria to treat its sewage". This young lady was not interested in any scientific information I had to present on this issue. This attitude disappointed but did not surprise me, and it did have the positive effect of spurring me to briefly summarize the state of the science relative to the Victoria sewage issue and then comment on the broader significance of ignoring or misrepresenting scientific information when making environmental decisions.

I have been involved in studies at the CRD outfalls since the early 1970s when, as a student, I assisted in a submersible examination of the Macaulay Point Outfall receiving environment. I became more heavily involved in 1991 when I was part of a consultant team examining sewage treatment options for the CRD's Phase II Liquid Waste Management Plan. As a member of that team I attended a public meeting of the CRD Board, comprised of the mayors of the member municipalities and cities. My specific charge was to examine available scientific data regarding the level of impact that the wastewater discharges were then having on the receiving environment. I had to report that there were insufficient data to make a determination. However, in reply to comments by Board members that there was no time to obtain data necessary for informed decision-making, I disagreed and suggested that a suitable study could be conducted in about six months for a very small fraction of the hundreds of millions of dollars required for upgraded treatment. The Board listened and issued a competitive request for proposal (RFP) for such a study, which my firm subsequently won. The study was successfully completed in 1992. The results of this study were published in the peer reviewed literature (Chapman et al., 1994, 1996a,b) as were subsequent, additional studies (Taylor et al., 1998; McPherson et al., 2002).

The receiving environments for the two outfalls differ: Macaulay Point Outfall discharges to a soft-bottom environment whereas Clover Point Outfall discharges to a hard-bottom environment. The findings of the 1992 study provided, not unexpectedly, clear evidence of alterations in benthic communities around the two outfalls. For instance, growth of deep-sea horse mussels (*Modiolus modiolus*) around the Clover Point Outfall is enhanced by increased nutrients from that outfall. Alterations in soft-bottom benthic communities around the Macaulay Point Outfall occurred primarily within 100 m of the discharge, mainly due to organic enrichment, but with two chemicals suspected of possible toxic effects: mercury and 1,4-dichlorobenzene.

The findings of the 1992 work were presented to the citizens of the CRD, who subsequently decided in a referendum to concentrate on source control (aimed in particular at the above two suspect chemicals) rather than proceeding immediately to higher levels of wastewater treatment. As a result, the CRD Source Control program is presently one of the most comprehensive source control programs in North America.

Studies and monitoring of the CRD outfalls did not end with the 1992 study, rather they have increased in scope and frequency since the 1990s. (cf. http://www.crd.bc.ca/es/environmental_programs/wastewater_marine/index.htm). The studies continue to indicate that the wastewater discharges are not having major environmental impacts, and recent monitoring data suggest a possible improvement of environmental conditions since the 1992 study. The absence of major impacts is due to both relatively low industrial inputs and to the location of the two discharges (strong tidal currents with net movement through the Strait to the Pacific

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doi:10.1016/j.marpolbul.2006.03.006

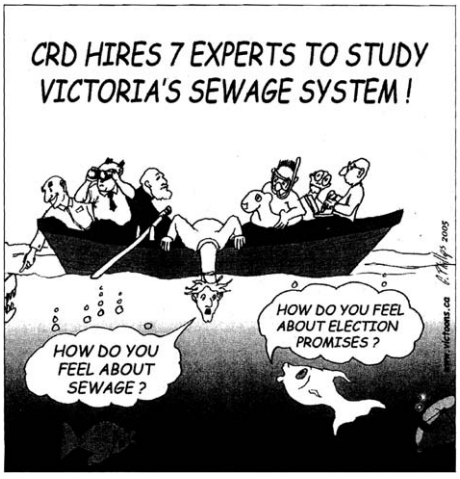
Ocean, substantial vertical mixing, substantial oxygenation, naturally high abundance of nitrogen). Whereas there are demonstrable alterations in aquatic communities, these alterations have not translated into substantial impairment of the resident communities. For example, statistical assessment of recent monitoring data (2000–2004) indicates that total invertebrate abundance, major taxa abundances, and biodiversity (taxa richness) near the Macaulay Point outfalls are similar to (or greater than) results at relatively uncontaminated reference stations.

The original decision not to proceed to higher levels of treatment was strongly supported by the former Canadian Fisheries and later Environment Minister (1997–2004), David Anderson, who commented "I want to put the money where it can do the most good [e.g., land acquisitions for parks, new hospital beds, creation of an urban transit system to reduce reliance on cars]...It's [higher levels of sewage treatment] not an environmentally sensitive thing to do" (Harnett, 2005). However, recently, public opinion has been shifting. Although there is no evidence of increased biological effects around the outfalls, in fact the contrary, environmental groups (and politicians in the US, the other side of the Strait of Juan de Fuca) have conducted a strong campaign for higher levels of treatment on the basis that "it is the right thing to do" and that intuitively there must be major adverse effects occurring. The main scientific evidence produced by the environmental groups in support of their position is a controversial student thesis that measured only chemical contamination (not biological effects), that had quality assurance/quality control (QA/QC) problems, and that ignored all environmental monitoring data collected by the CRD in the last decade. Their gut-level public relations tool is "Mr. Floatie" (see photograph), who visits schools and appears at public events. The public relations campaign appears to be working. For example, in recent federal and local elections all candidates came out strongly in support of higher levels of sewage treatment for the Macaulay and Clover Point Outfalls (other CRD outfalls, which discharge into less optimal receiving environments, already have higher levels of treatment).

The CRD has commissioned two recent scientific studies related to the decision-making process. They contracted (via competitive bid) for a study to integrate environmental quality information for the two outfalls, summarize environmental effects to humans and other organisms, and make recommendations regarding the current wastewater and marine environment monitoring program. This work has been completed. The CRD also retained the Society of Environmental Toxicology and Chemistry (http://www.setac.org) to conduct a blue-ribbon scientific panel assessment of the available evidence. This assessment is in progress. However, some members of the popular press are not kindly disposed to the idea of independent scientific assessment as opposed to action (see the editorial cartoon from the local newspaper); "science-based answers" are ignored because "at the end of the day, you're dumping crap into the ocean, a pretty gross thing to do" (MacQueen, 2005, p. 26).

Unfortunately, when science is introduced into the sewage debate, it includes "junk science" that uses selected arguments, exaggerations, and scare-mongering tactics to position an argument (Mitchell, 2006). Worse still, some individuals have no compunction about ignoring facts if those facts do not support their thesis; flyers circulated in Greater Victoria have referenced non-existent fish kills and used flawed logic and inflammatory language to appeal to the public.

The Victoria sewage issue is a relatively small issue on a global scale, yet it has important implications. Humanity is currently facing a plethora of environmental issues ranging in order of severity as follows: increasing human populations and their drain on resources → global climate change → habitat change → exotic species introductions → eutrophication → toxic chemicals (Chapman,



1995). Given that there are at present, based on current political agendas worldwide, limited monies and resources for addressing environmental issues, arguably we need to focus on those that are the most important. David Anderson noted (Harnett, 2005) "To use electricity and more than $400 million [Canadian] dollars—the estimated cost of sewage treatment [for the CRD]—to artificially do what nature does well on its own is wasteful." The scientific evidence to date is clear (Golder, 2005): ecological effects attributable to the outfalls are small in magnitude and limited in spatial extent, do not translate into major effects on ecosystem function, are similar to North American jurisdictions with primary/secondary treatment, and may be decreasing over time.

The decision regarding sewage treatment for the City of Victoria must, of course, be made by the citizens of Victoria. If there were evidence that these discharges were impacting areas outside the CRD, then it would be appropriate for representatives of those areas to also take part in the decision, but this is not the case. Despite this, others are getting involved and the science is being ignored. Politics and ideology are presently driving the decision-making process.

I have no solutions for cases such as this, which are unfortunately far from unique, in which science and facts are ignored. The issue is not one of environment versus economy; misuse of science is equally damaging when management issues are distorted by any party or agenda. I can only urge that we all continue to emphasize, to those willing to listen, the importance of: good science in informed decision-making regarding the environment; using limited resources to deal with the most important local and global environmental issues, which may not always be the most obvious ones; and assessing all environmental actions in terms of both risk:risk and cost:benefit since all actions have environmental consequences (e.g., sewage treatment produces sludge that must be disposed of).

Science is not the only basis for management decisions, nor are all scientists always in complete agreement on technical issues. However, amid the polarization and politicization of this and other environmental issues, the value of quality science is being usurped by emotion. What is required, and what the SETAC panel will hopefully provide for the Victoria sewage debate, is a mechanism for rational discourse related to scientific issues, rather than entrenched positions, inflammatory retorts, and unwillingness to critically evaluate the underlying issues.

I will continue to try to present science and facts to environmental canvassers who come to my door. I hope you will all do the same—hopefully at some point we can get science and facts back into the decision-making process for this and for other issues and truly benefit both our environment and ourselves.

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