

Protecting Ocean Users from Sewage Related Illnesses

- some lessons from the UK?

Caribbean Water and Wastewater Association Conference 2000

Andrew Coleman

Caribbean representative and ex-Director,
Surfers Against Sewage



1. Introduction

This paper has been prepared for the Caribbean Water and Wastewater Association Annual Conference of 2000. It aims to inform participants of the bathing water testing regime in force in the UK, derived from the European Union (EU) Directives, give an overview of some of the issues relating to sewage treatment and bathing water quality, outline some issues for the Caribbean and provide some tentative suggestions for an approach to improve bathing water quality in the Caribbean.

The author of this paper is a British environmental planner working for the Government of the Republic of Trinidad and Tobago. However, the views expressed in this paper and the associated presentation do not reflect those of his employer. They are expressed as an ex Director of Surfers Against Sewage (SAS), a British environmental pressure group which he continues to represent in the Caribbean region.

The source of most of the information for this paper can be found in SAS's submission to the UK Parliament's House of Commons Environment Sub Committee Inquiry into Sewage Treatment and Disposal (1997/8). This document is attached for ease of reference. Other SAS documents can be easily accessed via its website: www.sas.org.uk.

2. Surfers Against Sewage (SAS)

SAS was formed in 1990 by Cornish surfers (in SW England) in response to close encounters with sewage and sewage related debris. Ten (10) years later, 3 of the UK water companies are implementing tertiary sewage treatment at all of their coastal locations and other companies are implementing it at selected locations. SAS has been described as one of the most successful pressure groups in the UK.

Its success can be attributed to effective campaigning, sound research and public support. Its campaigning has been directed at water companies (privatised in England and Wales since 1989), the European Union (whose Directives have driven legislation in member countries), the UK Government (irrespective of political control), the Environment Agency (which is responsible for implementing environmental legislation passed by the Government and carrying out prosecutions of polluters), OFWAT (the financial regulator of the water industry responsible for recommending the level of water charges), local authorities and companies. Its campaigning methods are high profile and media friendly - using strong images such as wetsuit and gas mask clad surfers and 3m long faeces. It has effectively used political lobbying, public demonstrations and legal action to force water companies, the Environment Agency and local authorities to discharge their responsibilities. SAS has the only database on sewage related illnesses in Europe (possibly the world) and has participated in research on the incidences of astrovirus and Hepatitis A in water users, particularly surfers. It has won public support because it is seen as taking on the 'fat cat' water companies (extremely profitable private monopolies), its strong media image and a genuine public concern for clean seas (which have consistently featured very highly in polls about environmental issues in the UK).

At the current time, SAS is concentrating on mobilising support for a revision of the EU Bathing Water Directive to tighten water quality standards to protect health and recognise that many thousands of recreational water users (surfers, windsurfers, canoeists, sailors etc) are not protected by the current standards.

3. Health implications

There is evidence from a number of medical studies that exposure to sewage in seawater can cause gastro-enteritis, ear, nose and throat illnesses, skin infection. There is also evidence that viruses can survive in seawater many hours or days (inc polio, Hepatitis, HIV). Studies have shown that surfers are more likely to contract viral infections of the astrovirus type found in sewage contaminated water and to contract Hepatitis A. SAS's own database indicates that many instances of illness occur at beaches which pass Government minimum standards for bathing water quality.

Typical bacterial loading of sewage effluent (Faecal coliforms / 100ml)

Raw	10 000 000
Primary-treated	1 000 000
Secondary-treated	100 000
Min EU standard	2 000
UV treated	35

The above table illustrates the bacterial loadings of sewage treated to different stages and the mandatory EU standard. It illustrates why SAS considers UV (or equivalent) to be the ideal level of treatment and why it considers the current EU standards to be inadequate. The current round of capital investment in sewage treatment will introduce secondary treatment as the normal minimum treatment, although UV is increasingly being adopted as a more cost effective option in the long

run. Because of issues of sustainability - especially energy usage - microfiltration is increasingly being used by UK water companies. Costs are slowly coming down and it is also more efficient than UV. There is also potential of being able to add reverse osmosis (RO) to give an effluent of drinking water quality - which may be particularly relevant to Caribbean islands which are already using RO for desalination to provide water for industrial processing and drinking water supplies.

Another reason for SAS's concern over current treatment and testing practices is that the indicator bacteria (total and faecal coliform) used by the EU in bathing water standards only survive a short time (hours or a few days) in seawater, yet viruses can last many days or weeks and therefore travel further from the discharge point. The concern is that viruses are difficult to test for and so more emphasis has been given to testing for faecal streptococci that survives longer in seawater than total and faecal coliform. There was found to be a statistically significant link between levels of faecal streptococci of 35/100ml and increased chances of gastro enteritis in a UK government funded research project..

4. European / UK bathing water quality

Bathing water standards in the European Union (including the French islands and Guyanne in the Caribbean) are derived from 1976 European Bathing Water Directive (76/160/EEC). The Directive concentrates on locations at which mass bathing occurs, not other watersports - a major criticism as far as SAS is concerned. In the UK, a very small number of beaches were designated at first - and the EU threatened legal action against the UK until it designated more - but no inland recreational waters until 1998, in contrast with other EU countries.

The directive sets out 'Mandatory' and 'Guideline' standards based on microbiological standards and other criteria e.g. ammonia, pesticides, salmonella etc. 20 samples are taken every bathing season (May - end September) - ignores use of bathing waters outside these period which is increasing due to the availability of cheap wetsuits. The much coveted European Blue Flag awards depend on passing 'Guideline' standard and other criteria relating to beach facilities. However, whether a beach passes or fails the mandatory or guideline standards is no guarantee that it is safe to bathe at, as results take a few days or longer to be publicised and the assessment is only made at the end of the bathing season - they are a measure of past performance, not current quality. Research into real time testing and prediction is continuing. There are also questions about the relevance of the indicator bacteria themselves - whether they actually represent the viruses and bacteria that make people sick.

EU Bathing Water Microbiological Standards

Mandatory Standard (95% of samples must comply)	Guideline Standard (80% of samples must comply)
10 000 total coliforms / 100ml	500 total coliforms / 100ml
2000 faecal coliforms / 100ml	100 faecal coliforms / 100ml
0 Salmonella / litre	100 faecal streptococci / 100ml
0 Enterovirus / litre	

For illustration, the draft World Health Organisation standards (currently under review) are set out below, based on the likelihood of bathers becoming ill:

Draft World Health Organisation standards (currently under review)

Faecal Streptococci/100ml	Estimated Burden of Disease
10	< 1 excess incidence of illness in 400 exposures to bathing water
50	95%ile value associated with a single excess case of illness in 320 exposures
200	95%ile value associated with a single excess case of illness in 80 exposures
1 000	95%ile value associated with a single excess case of illness in 80 exposures

The implications of these standards, if adopted at a 50fs or 200 fs thresholds, will be considerable - it has been calculated that the vast majority of bathing waters in some parts of the UK would fail the revised standards. The financial implications in the UK and elsewhere would be enormous and the WHO is currently reconsidering these draft standards.

5. EU Urban Wastewater Treatment Directive (1991)

This Directive determines levels of treatment necessary for outfalls serving different size populations and gives deadlines for implementation of sewage treatment schemes. For example, for sewage treatment plants serving population equivalents greater than 15, 000 people, secondary treatment should be provided by the end of 2000. There are a number of qualifying preconditions and the previous UK government took the opportunity to use these to the maximum to reduce obligations on privatised water companies to treat sewage. Examples included declaring large estuaries as open sea (and therefore requiring primary, rather than secondary treatment) and declaring High Natural Dispersion Areas (HNDAs), again which only required primary treatment. It took legal action, or the threat of it, to review these decisions and one of the first actions of the Labour government was to effectively abandon HNDAs.

One of the effects of the Directive criticised by SAS was 'just in time' investment by water companies, whereby they would calculate the cost of capital investment and charge their customers for it over a 5 year period, but implement it right at the last possible moment or, often, afterwards as many projects overrun due to planning battles. The opposite of 'buy now, pay later'!

The Directive also banned sewage sludge dumping at sea from the end of 1998. This, coupled with the increased levels of treatment, has resulted in large amounts of sewage sludge being produced, which needs disposal or re-use. This has presented water companies with considerable challenges and new environmental impacts to consider. Options being used include spreading on farmland

(after treatment and subject to heavy metal content and controls on the use that the land can be put to), conversion into soil conditioner and incineration.

6. Progress towards cleaner seas?

In UK, Environment Agency set standards of levels of treatment and different companies adopted different approaches from 'pump and dump' to full treatment. Since 1990, 3 companies in England and Wales (Wessex, Yorkshire and Welsh) have voluntarily adopted full tertiary (UV or microfiltration) treatment policies for all coastal outfalls. They have done this for financial and environmental reasons - they have seen the writing on the wall in the form of tighter standards. Other water companies are adopting a more ad hoc approach - identifying sewage outfalls which are likely to need tertiary treatment to protect large tourist towns where there has been pressure from SAS and tourist organisations for tertiary treatment or shellfish beds (another 'driver' of better treatment has been the identification of nearly 80 shellfish growing areas under the EU Shellfish Directive).

£8.5b (US\$12.75b) investment in environmental improvements for the aquatic environment is promised by the end of 2005. Most coastal outfalls will have at least primary and secondary treatment by then and an estimated 14m people will have tertiary treatment.

A new Draft EU Bathing Water Directive is currently being considered - stricter standards using faecal streptococci are likely and SAS is pressing, along with other recreational water users, for better standards for all users, not just bathers. SAS is also pressing for wider, quicker dissemination of bathing water test results to better inform the public of water quality.

7. Caribbean implications?

Many Caribbean economies are heavily dependent on beach and ocean-based tourism for income and jobs. There is great potential for bad publicity from sewage related illnesses, especially as many tourists come from countries where there is increasing awareness of sewage pollution at beaches. The impacts of foreign owned holiday companies withdrawing from a resort or island could be disastrous. Similarly, bad publicity among groups such as divers or in guidebooks for independent travellers can disproportionately affect income from tourism.

The Caribbean enjoys variable levels of sewage treatment - including relatively few (mainly old) municipal systems with varying levels of maintenance and low levels of treatment, many small package plants, many uncontrolled direct discharges from domestic and industrial users, leaking septic tanks, agricultural run-off and discharges from yachts.

There appears to be irregular testing of bathing water and not well publicised results. As a result the public is not well informed about sewage pollution and it is not uncommon to see people bathing in polluted seawater.

8. Environment Tobago

Environment Tobago is an independent environmental NGO which has embarked on an ambitious programme of testing bathing water (involving schools and with the support of the national water company and the UNDP).

Environment Tobago found levels of faecal coliforms from waste outfalls at beaches used for public bathing of levels in 10's of thousand and higher. It is now developing a sustainable community based wastewater treatment project for a small coastal settlement served mainly by aging septic tanks, soakaways, pit latrines and direct discharges into watercourses and the ocean (ref: Carissa Kuempel, (Santa Clara University) and Kamau Akili (Environment Tobago), Charlotteville Household Survey Report Tobago Wastewater Disposal System Improvement Program; Pilot Project: Charlotteville, Tobago; Collette River. August 25, 2000). This innovative approach (which is currently in need of funding) could be applied to areas of Caribbean countries that are unlikely to be provided with large scale municipal systems.

9. Guadeloupe and Martinique

As part of France, the two islands (and Guyane) are tested under the EU bathing water regime. Although France did not report any results in 1999, the 1998 results show a number of failures of mandatory standards - 5 (out of 92 coastal bathing waters) in Guadeloupe and 2 in Martinique (out of 32 coastal bathing waters)

(website addresses: <http://europa.eu.int/water/cgi-bin/bw.pl?water=-1&calc=FR9&call=2&code=FR91&level=5> and <http://europa.eu.int/water/cgi-bin/bw.pl?year=1998&water=-1&level=5&code=FR9>)

10. What could be a Caribbean approach?

The following is a suggested approach to improve water quality for all users - tourists, local bathers, divers, windsurfers, surfers, yachties etc.

- Identify waters vulnerable to sewage pollution - beaches / resources (e.g. reefs, mangroves) with large amounts of bathers or where sewage pollution can cause harm to public health or affect the environment.
- Prioritise these areas using techniques such as economic valuation - putting a \$ value on these resources, to help justify public and private investment. These should consider use and non-use values e.g. sewage pollution can harm mangroves and coral reefs, which are vital nurseries for fish and perform valuable coastal defence functions. There is a growing awareness of and expertise in these techniques in the region.
- Enter into discussions with hotels/tourist interests and other stakeholders (government, water agencies, local communities, fishermen) to discuss the issues and ultimately improve existing

infrastructure and investment in new infrastructure. Gaining support either through existing partnerships or working arrangements (tourist / hotel authorities, coastal zone management etc) or by setting up new partnerships is vital to securing public support and financial resources.

- Begin testing bathing water quality and publicise results using posters at beaches, hotels, media and internet. This assumes countries have applicable bathing water standards, skills and facilities for bathing water testing. Raising public and political awareness is a vital (if not painless) stage in addressing sewage pollution. SAS calls this the 'Jaws' syndrome - the mayor of the town that the Great White was terrorising pretended to the wider world that the shark did not exist, as his townspeople were being devoured. SAS's experience in the UK is that most stakeholders are aware of the problem where it exists and will often unite to improve the situation as it is in everyone's interest in the long term.
- Use new developments as an opportunity to implement state of the art sewage treatment (giving tertiary level results) for the whole area (through planning agreements), shared with the public sector.
- Try innovative projects such as that used by Environment Tobago.
- Look at the whole of the water treatment cycle - increasing water conservation and rainfall capture, increasing the use of 'grey' water for non drinking purposes will reduce the need for water treatment and will also make it easier to adapt to the effects of climate change.
- Rethink assumptions that toilets have to be water closets - research the effectiveness and suitability of composting toilets in appropriate (rural) areas.

Contacts:

Andrew Coleman - email: colemanaj@rave-tt.net ; tel: 868 622 1932.

Surfers Against Sewage - website: www.sas.org.uk ; tel: 44 1872 553001

Environment Tobago - website: www.scsoft.de/et; tel: 868 660 7462

EU water website: europa.eu.int/water/

WHO water quality website: www.who.int/water_sanitation_health/Water_quality/recreat.htm