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Clean Harbours Partnership

Turning the tide on harbour pollution

Project Spotlight Update: Issue 4, January 2023

This is an update for those that have generously sponsored Project Spotlight – a citizen science research study into the quality of sea water in both Chichester and Langstone Harbours. The Clean Harbours Partnership is a unique collaboration of local groups and individuals concerned about "what's in the water". We adopt an evidence-based approach to help inform local opinion, raise awareness and influence improvement.

Meaningful Progress…

CHP believes there are 5 main pollution pathways which need significant improvement – wastewater discharges from Southern Water; leaching from historic landfill; agricultural and highway run-off; and the activity of water users ourselves. CHP aims to influence improvement to each of these pathways.

Our main initiative is to identify substances found in harbour water to 'finger-print' sources of pollution, whilst at the same time starting to understand implications for public health and marine life.

Our main results have been long delayed, predominantly as a result of the longest drought since 1976 and delays at Brunel University. However, along the way the Partnership has been able to start making a difference. Examples have been covered in previous issues but include:

- Analysis of local data highlighting c170 potentially illegal sewage spills (presented to the Government's Environmental Audit Committee and the Environment Agency)
- Reporting of pollution incidents at Lavant, (supported by the BBC) leading to urgent reconstruction of part of the Wastewater Plant.
- Providing evidence to help change the approach taken by custodians of our water including Chichester Conservancy and Langstone Harbour Board.

Against this background, we are pleased to say that lab results are now starting to come through, which give some interesting insights and will better inform the debate during 2023.

Shocking levels of sewage discharges…

Southern Water has become the "lightening conductor" for local frustration and since the drought finished in October, there has been plenty of evidence to show why.

Overflowing Drain, Bosham High Street
16th November 2022

According to their own data, the company released untreated sewage into our environmentally protected harbours for a shocking 2,000 hours during October, November and December. This included continuous dumping from 21st December until 28th at Langstone and Bosham – Happy Xmas from Southern Water?

And the situation has continued into the New Year. As at 18th January, Thornham has been dumping for 625hrs (since 23rd December); Bosham since 10th

January (200 hrs); and Langstone almost continuously since New Years Day (400 hrs). These are not isolated incidents with outflows at Chichester, Emsworth, Nutbourne, Chidham, Drayton, Cosham and Fort Cumberland also adding to the cocktail.

Rainfall has been heavy/seasonal but years of under investment, profit taking and ineffective regulation continues to show itself. There are many examples of untreated wastewater flowing into the public realm due to Southern Water's lack of capacity and aging infrastructure. Below are two recent situations which CHP has reported to the Environment Agency and await a formal response.

Sewage spilling out of a road drain on Sheepwash Lane, Lavant in November:
https://youtu.be/uFwRqOeYd8Y

Overflowing waste water running down the sides of a tank at the Waste Water Treatment Works at Lavant in December:
https://youtu.be/8bnBVWGqTFE

CHP Bacteria Testing….

As we increase the pressure for change, headline discharge figures are limited in their ability to describe the true situation. The Clean Harbours Partnership therefore aims to go a stage further by scientifically identifying what's being put into our harbour water.

During November water quality officers from several sailing clubs took seawater samples to test for E.coli and Fecal Streptococci bacteria. Samples were placed in cool bags and taken the same day by our volunteers to the closest accredited laboratory in Fareham. The team adopted the same standards used by the Conservancy and contained in the EU Bathing Water Directive.

In summary, these describe "failures" as readings of over 500 cfu/100ml for *E.coli* and 185 cfu 100/ml for Fecal Streptococci.

Samples were taken close to sewage discharge pipes without the benefit of extensive dilution as wastewater spreads throughout harbour waters. Results across the board were shocking, with 'failure' rates many, many times acceptable levels.

These were supported by the Conservancy's own monthly tests which failed the threshold levels at 6 out of 9 sites in November. Unfortunately, Langstone Harbour Board (operated jointly by Havant Borough Council and Portsmouth City Council), do not test water quality.

Location 15/11/22	*E.coli cfu/100ml*	*Multiple above failure rate*	*Fecal Streptococci cfu/100ml*	*Multiple above failure rate*
Emsworth	7,300	**x 14**	860	**x 4**
Budds Farm	380,000	**x 760**	5,900	**x 32**
Thornham	810,000	**x 1,620**	67,000	**x 362**
Bosham Hoe	50,000	**x 100**	1,300	**x 7**
Bosham Channel	1,000	**x 5**	360	**x 2**

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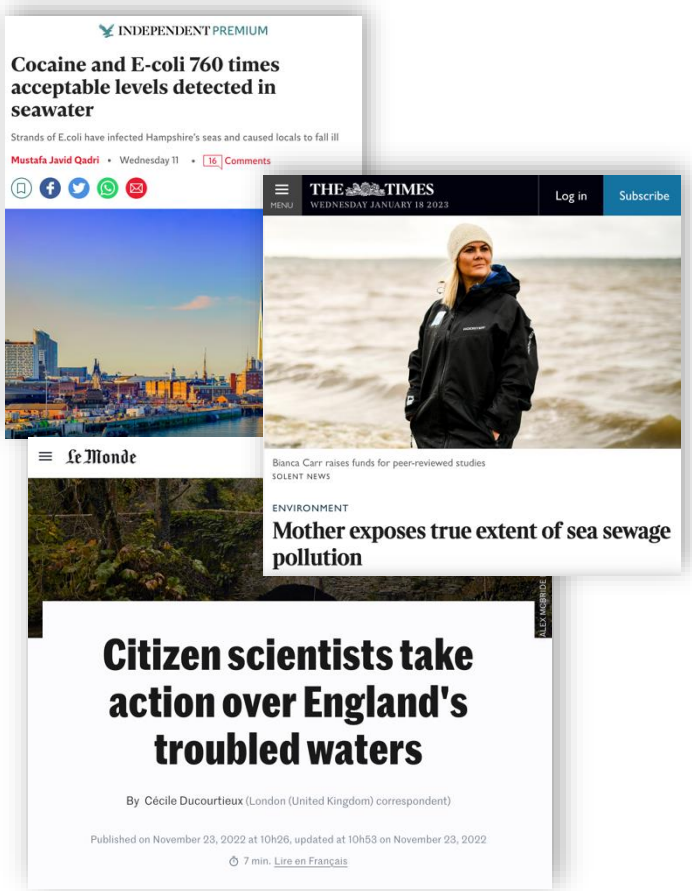
Our results caught the attention of both national and local media including:

- **The Times:** https://www.thetimes.co.uk/article/mother-exposes-true-extent-of-sea-sewage-pollution-9mr03875h
- **BBC News:** https://www.bbc.co.uk/news/uk-england-hampshire-63961426
- **Sussex World:** https://www.sussexexpress.co.uk/news/people/potentially-dangerous-levels-of-e-coli-in-chichester-harbour-study-finds-3950530
- **Le Monde:** https://www.lemonde.fr/en/united-kingdom/article/2022/11/23/citizen-scientists-take-action-over-england-s-troubled-waters_6005305_135.html
- **The Independent** https://www.independent.co.uk/news/uk/home-news/cocaine-ecoli-water-sewage-hampshire-b2260343.html



Why Measure *E.coli* & Fecal Streptococci?

There are two main reasons. Firstly, they are inexpensive to measure; and secondly both are good "indicator organisms". That is to say, their presence in seawater gives an indication of how likely the water is to contain other foreign substances, including organisms (usually viruses) that cause illness to humans. Some strains of *E.coli* can also cause disease in their own right, especially gastroenteritis and infections, sometimes resulting in more serious illness such as sepsis.

A study in Canada indicated that 10 mins immersion in sea water containing 200-500 cfu/100ml Fecal Streptococci, gives a risk to the swimmer of 5-10% of getting gastroenteritis. Levels that support the formal Bathing Water threshold of 185 cfu/100ml.

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Project Spotlight – Phase Findings:

In sharp contrast with two simple bacteria, the main thrust of Project Spotlight is testing for c500 chemicals in the harbour water. The study will accelerate our knowledge of 'what's in the water'……and the first validated results are starting to come through.

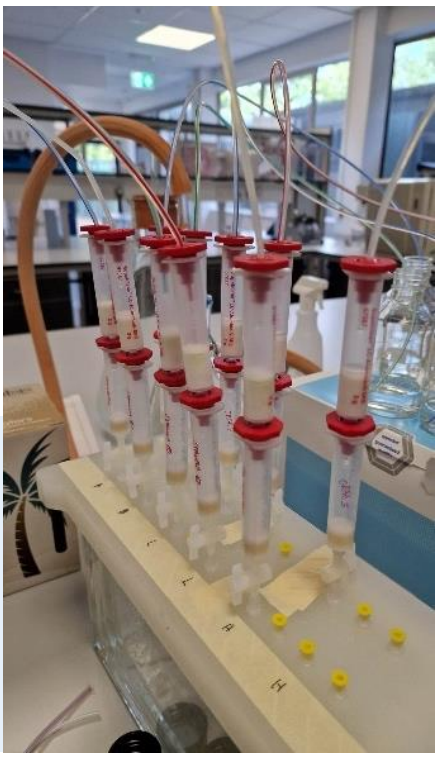
Earlier in the year, Prof. Alex Ford (University of Portsmouth) and CHP collected several different organisms near Budds Farm treatment works in Langstone Harbour. The samples were sent to Dr Thomas Miller (Brunel University) for chemical analysis using a technique known as liquid chromatography-mass spectrometry (LC-MS) which separates and measures complex mixtures of different chemicals.

The biota collected for analysis included the common shore crab (*Carcinus maenas*), amphipods (*Echinogammarus marinus*), ragworms (*Nereis virens*), seaweed fronds (*Fucus vesiculosus*), Limpets and Oysters. Brunel prepared samples which involved freeze-drying, followed by extraction of the biological material in organic solvents and after further clean-up steps, the samples were subsequently run using LC-MS over a three-day period.

An interesting range of chemicals have been detected across all the biological samples. A total of 42 unique chemicals were identified in the species, with the most contaminated samples being the seaweed fronds (24 compounds detected) and ragworms. Importantly both species are showing themselves to be insightful bioindicators for chemical pollution. The least contaminated samples were limpets with 9 compounds.

Compounds included pharmaceuticals such as oxazepam, temazepam and venlafaxine (linked to anxiety, anti-depression and insomnia), as well as trimethoprim and medroxyprogesterone (urine and uterus infections). Other common chemicals included recreational drugs such as cocaine, ketamine, MDMA and nicotine.

Results suggest a strong link to human sewage and therefore discharges from local wastewater plants but at the same time a range of herbicides and insecticides were also detected, most likely emanating from local farming and gardening.



Next Steps:
300 surface water samples collected by our citizen scientists have been prepared and are currently undergoing final validation, with results expected imminently. Recent rainfall also means that CHP volunteers have (at last) been able to collect post storm samples. These were taken at several sites over 5 days and will be put through the same process….and in the absence of any water testing in Langstone Harbour, CHP will be introducing regular bacteria tests in February.