Yesterday, my husband brought to my attention an article that appeared in the February 4, 2019 edition of the Mail Tribune. It's entitled "Ashland Canal Loses 62 Million Gallons" and was written by Caitlin Fowlkes.

In this article a statement is attributed to an employee of the City of Ashland and states, "the bacteria (*E. coli*) grows under sunlight, so if the water is enclosed underground, the bacteria will decrease significantly." Now, I don't know whether the employee actually said this or whether the reporter misrepresented what the employee said, but it is inaccurate information and is unfortunate that it has been disseminated to the public. I feel compelled to correct it.

E. coli is actually killed by sunlight and U. V. light is often used to kill pathogens in fresh water. "Non-government organizations recommend that rural communities (or third world countries) with no treatment for basic drinking water should store their water in transparent plastic bottles, and that they place these bottles in direct sunlight for some hours before consumption."
(https://discovery.kaust.edu.sa/en/article/402/sunny-solution-for-killing-e.-coli)

The Nobel Prize in Physiology went to a Scandinavian scientist in 1903 for his studies on phototherapy and how UV light kills bacteria. The French began using UV water disinfection in 1906.

When E. coli is grown in a laboratory setting it is incubated in complete darkness at 37 °C (98.6 °F i.e. body temperature), and isn't this the same condition that is present in our guts?

If the irrigation ditch gets piped, think about the nice stable environment that will be provided for the bacteria to multiply. I'm guessing that the temperature of the water will be more consistent, the E. coli will not be subject to sunlight, and that there will still be sediment, a natural reservoir for the organism that will not be filtered out. My guess is that the E. coli present will continue to multiply, albeit at a slower rate, but it will continue to survive and multiply.

We've already seen that this is the case in the Ashland Creek Study especially between the Herbert St. site (143.6; 9 samples) and the TID outfall (163.7; 53 samples). Some of this could be explained by the huge discrepancy in the sample size between the two sites, and is one of the reasons why this study should not be used when making a decision to pipe the irrigation ditch or not. I remind you that the authors stated that "As the study did not initially focus on the TID ditch or areas along Ashland Creek above Lithia Park, a limited data set is available for these areas from which to draw conclusions. It would benefit future studies to collect a greater quantity of samples from the TID ditch and to collect samples from the time the TID ditch is turned on in April to when it is turned off in late September or early October. While this study indicates that the TID ditch is a conveyance for bacteria, the source of the bacteria remains unknown. Further study is warranted to enable more confident identification of locations and sources for E. coli entering Ashland Creek."

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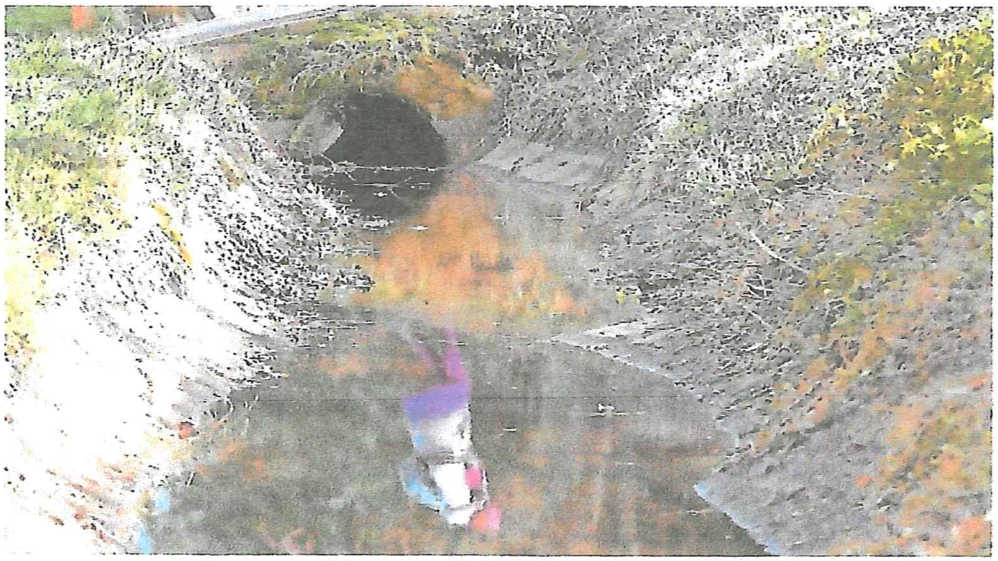
Ashland Canal loses 62 million gallons

by Caitlin Fowlkes for the Mail Tribune
Monday, February 4th 2019

AA



<p>File photo
A pedestrian walks along Park Street where it crosses the Ashland Canal.{/p}

The Ashland Canal loses about 62 million gallons of water per irrigation season due to evaporation and seepage.

That's enough water to supply the entire city of bout a month and a half during winter or supply irrigation to an additional 800 properties, city Conservation Analyst Julie Smitherman said at a community meeting Thursday evening at Southern Oregon University.

City staff and partners have recommended the city pipe a 2-mile stretch of the canal from Starlite Place to Terrace Street.

The Ashland Canal is a branch of the Talent Irrigation District system that serves Ashland. Most of the water delivered during irrigation season is stored in Emigrant and Howard Prairie lakes and Hyatt Reservoir.

TRENDING

Experts make tough decision on beached whale calf

Mess at the Mill

presentation of the preliminary engineering phase.

Mostly, homeowners seemed concerned with the potential for diminishing property values. If the canal is piped, construction for the staff's recommendation would require the removal of approximately 285 trees and landscaping due to a variety of reasons, such as roots that have grown into the current cement liner.

"If we continue to maintain the canal the way we currently are? we would have to remove trees anyway," Smitherman said.

→ it is not currently well maintained.

The other options for the project would require removal of fewer trees, around 260.

Various audience members piped up with concerns of loss of privacy once the trees are removed and fear of erosion.

"We are definitely listening and want to do what's right by making sure property values aren't affected," Smitherman said.

Staff reassured attendees that a decision has not been made yet. The City Council is expected to decide on one of four options March 5 at its business meeting. If the council decides to move the project forward, then the final engineering phase will begin, including an analysis of every home and trail easement backed up to the canal.

Public works has offered free backyard analyses to concerned homeowners. Public works can be contacted at 541-488-5587.

Besides reducing water loss due to leakage and evaporation, another benefit to piping the canal is that it would significantly reduce the amount of E. coli bacteria in the water, which is used to supplement Ashland drinking water in years of low water supply, Smitherman said.

Most recently, TID water has been treated for use as drinking water in 2018, 2015 and 2014.

Robyn Janssen, a Rogue Riverkeeper clean water campaigner, said the nonprofit supports the piping because it emphasizes its core value of improving water quality.

Rogue Riverkeeper performed an initial E. coli bacteria study in 2011 when the nonprofit learned there was an unusual amount of the bacteria in the Ashland Creek. Because the creek is home to native salmon and steelhead, the organization got involved.

They found that the main source of the E. coli was coming in at the canal outfall.

→ The study (2011) did not make this conclusion, but instead says the canal is a conveyance, the source is unknown.

E. coli lives in the intestines of warm-blooded animals and can be contracted through their feces, Janssen said. The open canal attracts animals to it as an easy water source.

The city of Ashland and the Rogue Valley Council of Governments conducted another study this past summer and found that although the amount of E. coli bacteria has reduced significantly, it's still coming in at the source.

Smitherman said the bacteria grows under sunlight, so if the water is enclosed underground, the bacteria will decrease significantly. → FALSE!

If the project moves forward, construction would begin in the fall of 2020 and take two winter seasons to complete to avoid interfering with the irrigation season.

Contact Tidings reporter Caitlin Fowlkes at cfowlkes@rosebudmedia.com or 541-776-4496. Follow her on Twitter @cfowlkes6.

From U. S. Water System:

Q. – HOW DOES UV LIGHT KILL BACTERIA?

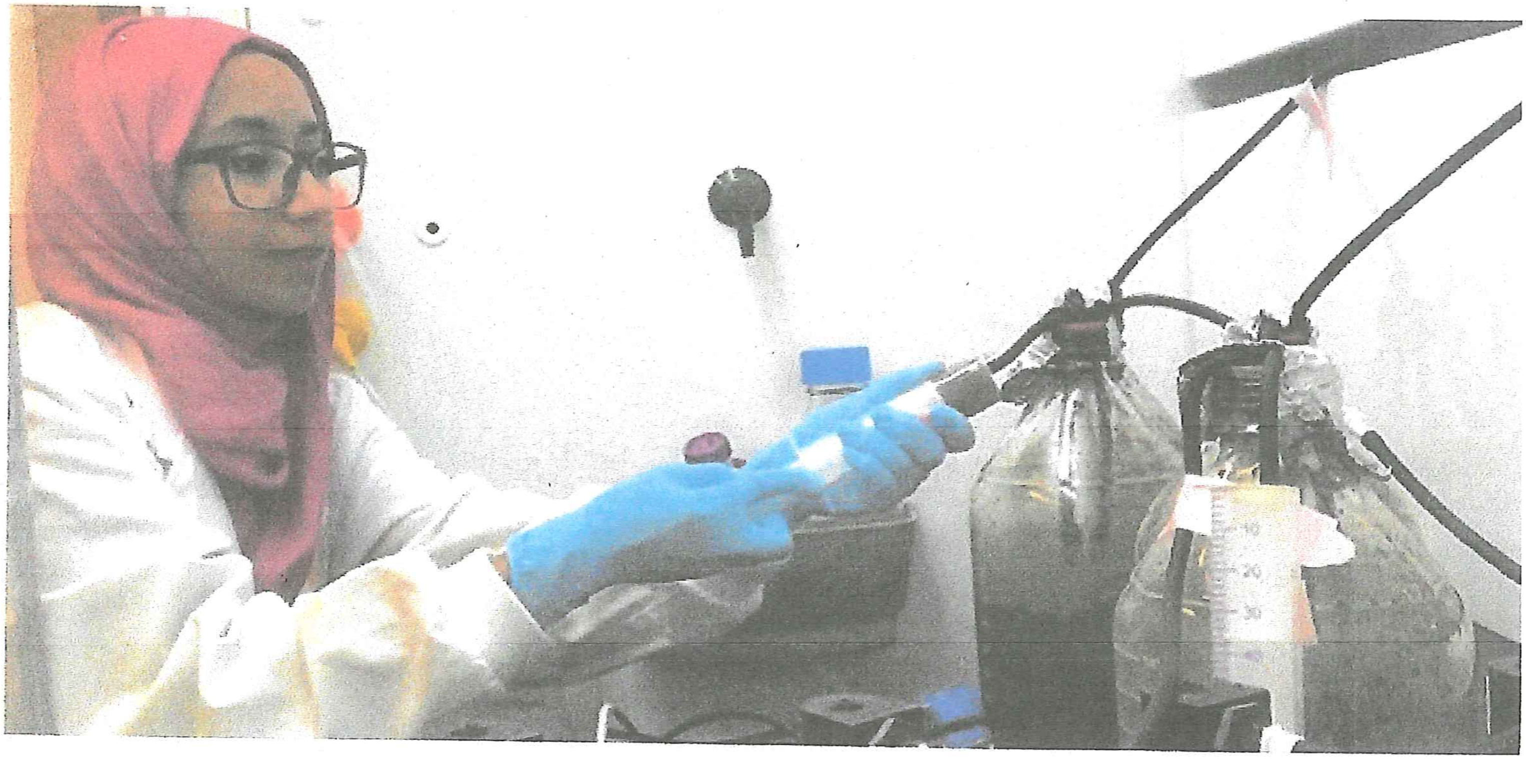
A. *– UV or ultraviolet light is a type of radiation. In simple terms, when bacteria or another type of microbe is directly exposed to certain types of UV light, the DNA (its fundamental building block) of the cell is damaged, preventing it from replicating. If a cell cannot reproduce, then the cell cannot cause infection, which is how UV light kills bacteria.*

Q. – I'VE NEVER HEARD OF UV AS A TREATMENT METHOD BEFORE, IS IT NEW?

A. *– Ultraviolet light has been used for water treatment for over 100 years. Scandinavian scientist Niels Finsen was awarded the Nobel Prize in Physiology in 1903 for his studies on phototherapy, and how UV light kills bacteria. UV water disinfection was first used by the French in 1906 and advancements in the technology have allowed it to become commonplace in the residential, commercial, and municipal markets over the past 20 years. Today, UV is likely the first form of treatment that many people consider when looking to address microbiological concerns in their drinking water.*

Q. – I HAVE BEEN HEARING ABOUT A LOT ABOUT E. COLI ON THE NEWS. IS UV EFFECTIVE AGAINST THIS MICROORGANISM?

A. *– Escherichia coli, or E. coli for short, is a bacterium found in the lower intestine of warm blooded organisms. There are many strains of E. coli, some of which can be found in the water supply. Although this bacteria has been blamed for many deaths (i.e. Walkerton in 2000), when exposed to ultraviolet light, at relatively a relatively low dose, it is easily destroyed. Even the particularly virulent O157:H7 strain of E. coli has a 4-log (99.99%) reduction at a UV dose of 6 mJ/cm^2. It should be mentioned that all US Water UV systems deliver a UV dose in excess of 30 mJ/cm^2 at the end of the lamp life.*



E.coli | water resources | environmental science and engineering

Sunny solution for killing *E. coli*

[illegible] ***E. coli*** [illegible]

Nov 12, 2017

Increasingly virulent strains of *Escherichia coli* are circulating in wastewater around the world, and the race is on to find novel treatment processes that could help reduce the spread of these pathogens. KAUST researchers examined how three strains of *E. coli* found in Jeddah's wastewater supply fared when placed under strong sunlight: they showed, while two strains were reduced, one strain persisted.

Nada Al-Jassim and coworkers conducted experiments to verify whether solar irradiation can be used to kill *E.coli* strains in wastewater.

"Solar irradiation is used unintentionally in many places when treated wastewater is stored in an evaporation pond prior to reuse or when it is used to irrigate crops in daylight," says Pei-Ying Hong, who led the project with PhD student Nada Al-Jassim and coworkers at KAUST's Water Desalination and Reuse Center. "However, because this approach is unintentional, it is difficult to know how successful it has been. We therefore decided to analyze what happens to *E. coli* in wastewater under solar irradiation."

Sunlight is known to kill pathogens in freshwater. In fact, as Hong notes, nongovernment organizations recommend that rural communities with no treatment for basic drinking water should store their water in transparent plastic bottles, and that they place these bottles in direct sunlight for some hours before consumption.

Hong's team used a similar idea; they prepared two reactors each carrying a strain of *E. coli*—a recently discovered, highly antibiotic-resistant strain called PI-7, and a common, nonvirulent strain called DSM1103. These reactors were subjected to solar irradiation for 24 hours, while two identical reactors were stored in the dark as controls. The team took samples at regular intervals from the four reactors and analyzed changes to the genetic make-up and the survival rates of each strain of *E. coli*.

"The viable cell counts of both strains reduced considerably, but *E. coli* PI-7 decayed at a slower rate compared to DSM1103," says Hong. "Rather worryingly, and unlike DSM1103, PI-7 formed 'persister' cells in the later stages of prolonged solar exposure. This means a small portion of PI-7 cells can withstand solar treatment and regrow again when the environmental conditions become favorable."

PI-7 defended itself against solar irradiation by upregulating genes related to cellular repair and oxidative stress, along with various virulence factors. However, during the genetic analysis, Al-Jassim noted with interest that genes carried by PI-7 to protect it from viruses were downregulated during solar irradiation.

"I'm now working on isolating these viruses, known as bacteriophages, in the hope that they could be used to increase the susceptibility of PI-7 toward solar irradiation," says Al-Jassim. "By using both bacteriophages and solar irradiation at the same time, such antibiotic-resistant strains might be more easily killed off."

References

1. Al-Jassim, N., Mantilla-Calderon, D., Wang, T., & Hong, P-Y. Inactivation and gene expression of a virulent wastewater *Escherichia coli* strain and the nonvirulent commensal *Escherichia coli* DSM1103 strain upon solar irradiation. *Environmental Science and Technology* **51,** 3649–3659 (2017).| article