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Measuring Health Risk in Bathing Waters using AQuA

A Validation Test of Citizen Science Sampling for E.Coli

BACKGROUND:

The AQuA project, led by The University of York academics, https://aqua.york.ac.uk/ aims:

"To co-create & use new citizen science tools which measure environmental endpoints not typically studied by citizen science to better understand chemical and microbial contaminants in Yorkshire's rivers and lakes via excellent, inclusive, and engaged environmental science".

Nine citizen science groups are partners in the study, including Nidd Action Group (NAG)

Early AQuA activities include the development of **a modern and comprehensive citizen science test kit**, to be used by citizen scientists to detect and monitor pollution in freshwater rivers and lakes in Yorkshire.

QUESTIONS:

But are the results obtained by citizen science groups on the river banks valid? Can they be trusted, when compared with the laboratory results obtained by official agencies such as the Environment Agency.

At The Lido, Knaresborough on **September 16th, 2025** a validation activity took place aimed to test two questions about measurements of the concentration of E.coli bacteria in the river water.

- When we use the exact same water sample, how close are the results for E. coli generated by the AQuA citizen science method compared to the EA 'gold standard' test?
- Does the way AQuA citizen scientists collect a sample (via a bucket on a string from the river bank) make a significant difference in E. coli numbers relative to how the EA collects their sample?

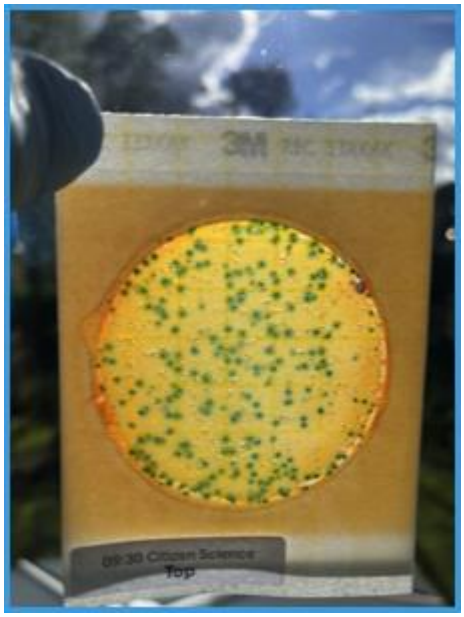
High levels of these organisms are associated with threats to the health of people and pets entering the water.

RESULTS:

- The results confirmed that counts of E.coli concentrations obtained by citizen scientists using the same water sample that the EA collected, and using the sample collected using the AQuA protocol at the same time were not statistically different (i.e. should be regarded as the same).
- This not only justifies the method AQuA uses but means that more costly, slower results obtained from conventional laboratory analysis can be safely supplemented by the simple,r quicker samples obtained by citizens using this protocol on the river bank.

The day of the test followed a period of heavy rain, that resulted in the recorded discharge of polluted surface water from combined sewer overflows (CSOs) upstream of the Lido into the river Nidd, as well as no doubt runoff from riverside fields into the Nidd.

The E.coli concentrations were therefore extremely high that day (25,000 colony forming units (cfus)) compared with the 'sufficient' level of below 1,000 cfus Bathing water profile



Given that the AQuA protocol required volunteers to count the number of cfus in 1 ml of river water, circa 250 on average, by eye this remarkable test of validity means we can trust the results produced by our volunteer citizen scientists with more typical lower concentrations

ACKNOWLEDGEMENTS:

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David Clayden

NAG Chair

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