

The Invisible Buffet: How Much Are We Feeding the Bacteria in our Drinking Water?

Eric Cowan^a, Emma Goslan^a, Francis Hassard^a, Irene Carra^{a*}

^aCranfield University



Year 2

What is AOC?

'Assimilable' organic carbon (**AOC**) is a term to describe the most easily-consumed bacterial food.

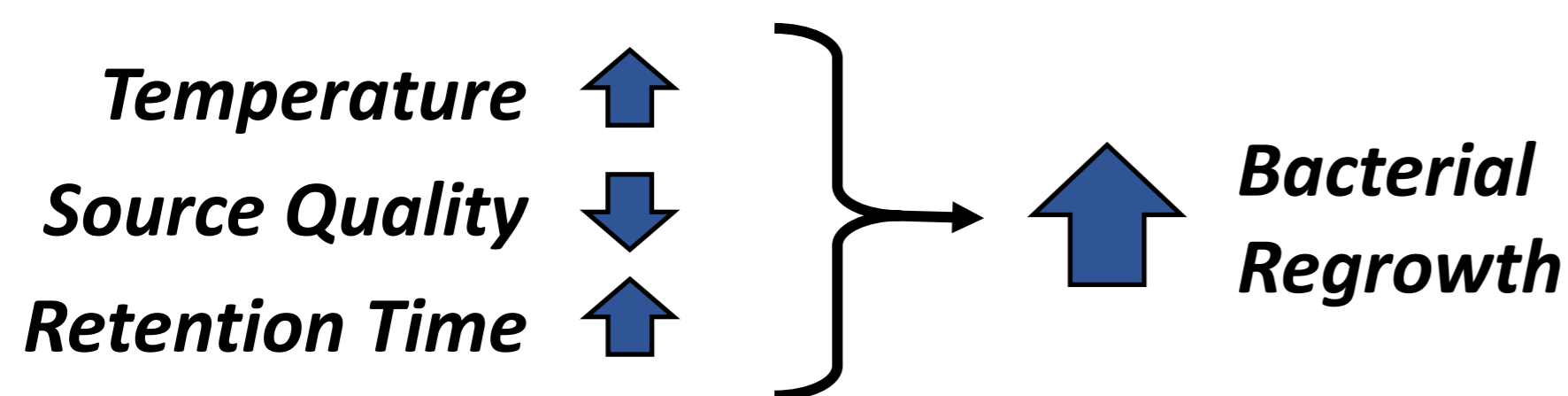


Easily Consumed

Technically Consumable

Not Always Consumable

Maintaining low AOC levels is important for preventing bacterial regrowth in drinking water—a challenge exacerbated by climate change^{1,2}.

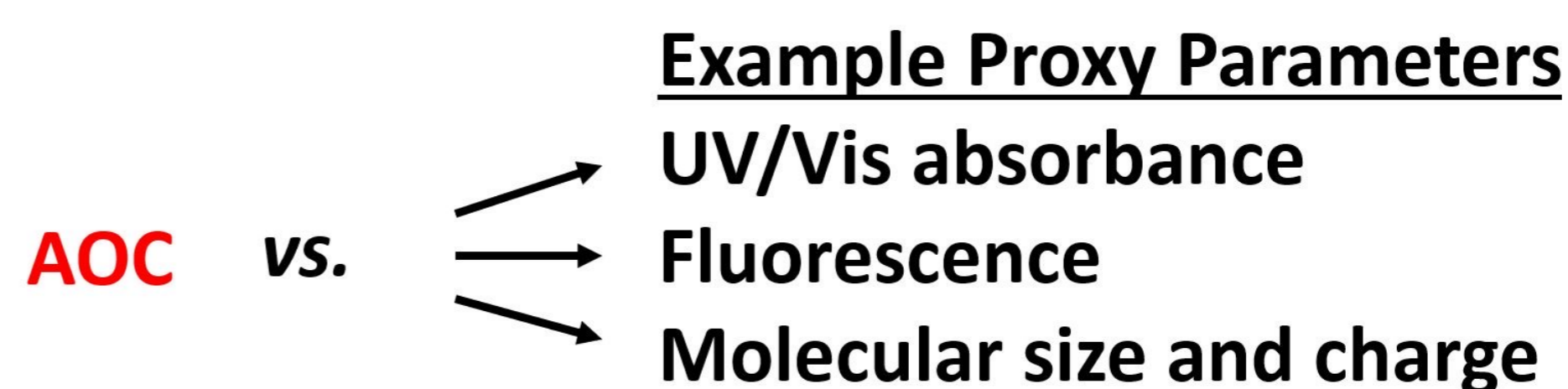


My Project Plan

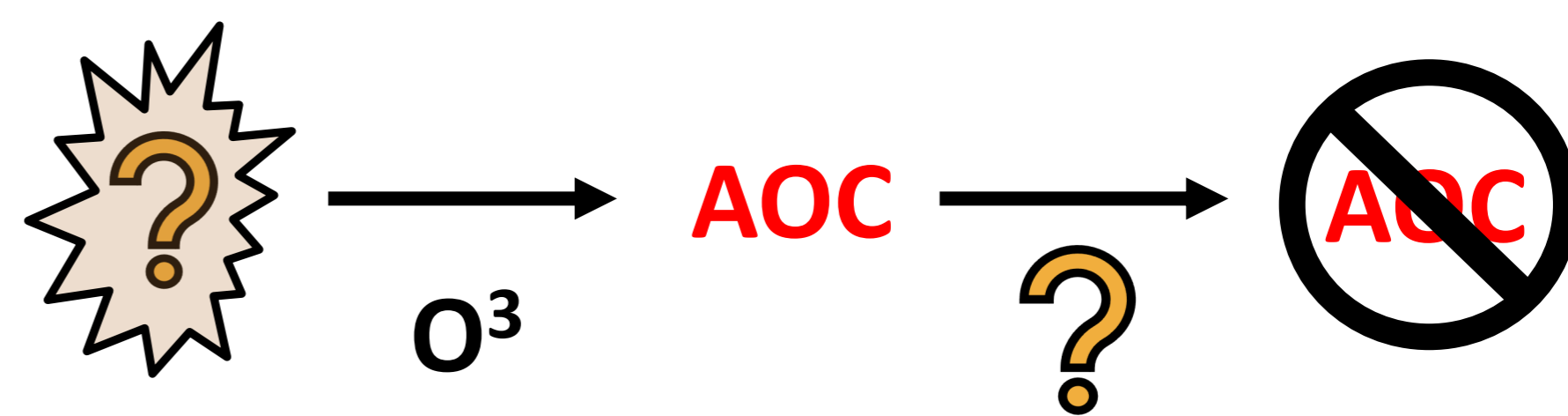
1. Compare current AOC quantification methods.

Method A vs. Method B vs. Method C

2. Evaluate 'proxy' AOC measurements.



3. Investigate the formation and removal of AOC.



How is AOC Measured?

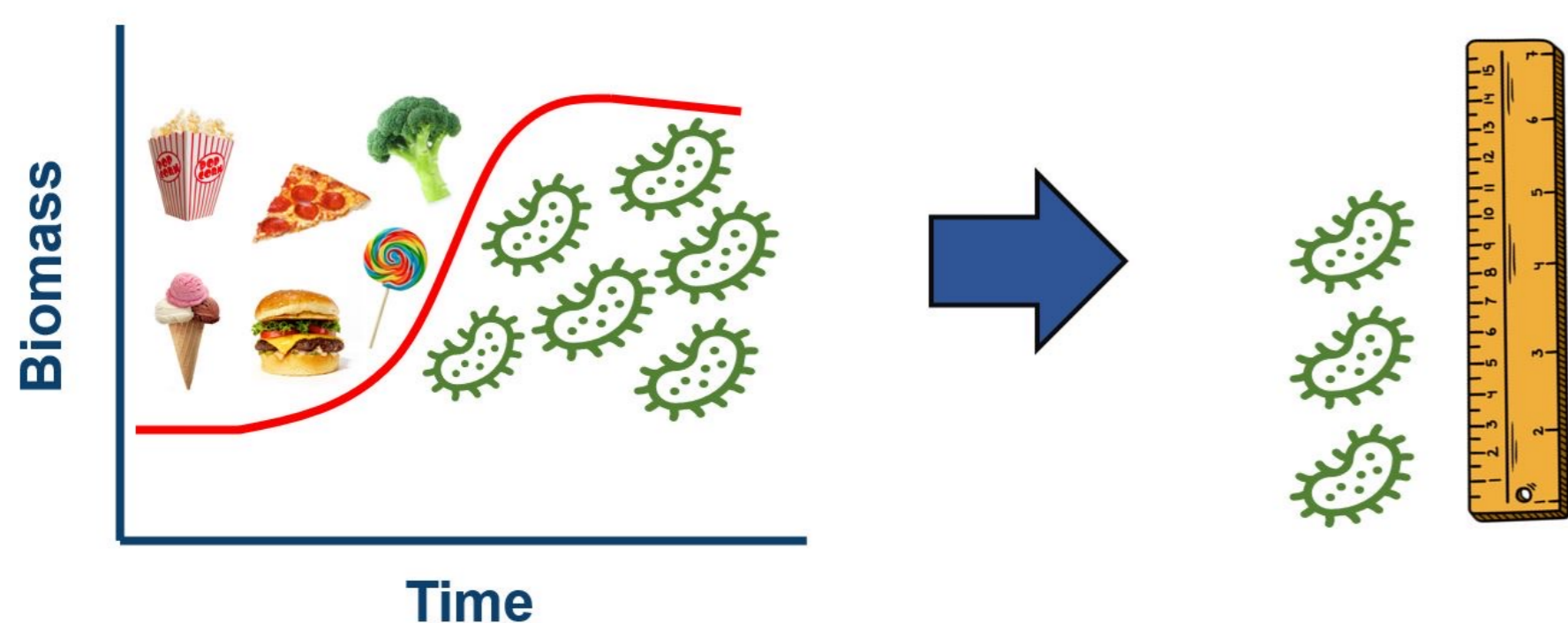
AOC is too complex to measure directly; instead, we let bacteria consume all AOC then quantify the newly-formed biomass:

1. Culture

Convert AOC to biomass

2. Quantify

Measure final biomass



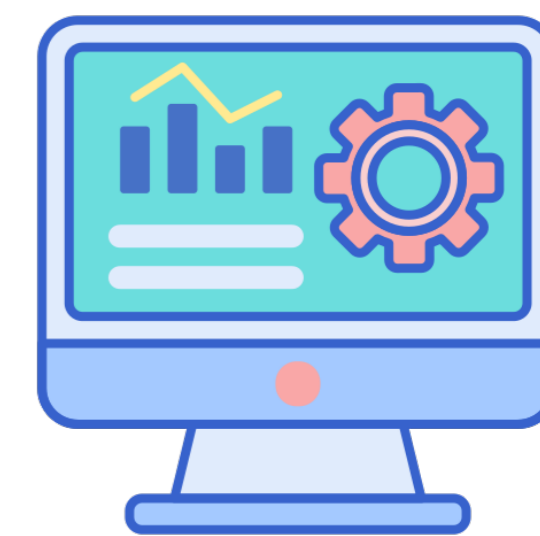
Prospective Impact



Better Monitoring



Cost-Savings



Informed Decision Making

The Problem...

Measuring AOC is **slow**, **labour-intensive**, and has **no "Gold Standard" method**^{2,3}.

Consequently, **despite a global demand** to monitor bacterial regrowth potential in drinking water...

Regular AOC monitoring remains extremely rare!!!

References

¹van der Kooij, D., Visser, A., & Hijnen, W. A. M. (1982). Determining the concentration of easily assimilable organic carbon in drinking water. *Journal (American Water Works Association)*, 74(10), 540–545.

²Prest, E. I., Hammes, F., van Loosdrecht, M. C. M., & Vrouwenvelder, J. S. (2016). Biological Stability of Drinking Water: Controlling Factors, Methods, and Challenges. *Frontiers in Microbiology*, 7, 45.

³Pick, F. C., Fish, K. E., Biggs, C. A., Moses, J. P., Moore, G., & Boxall, J. B. (Directors). (2019, December 6). Application of enhanced assimilable organic carbon method across operational drinking water systems (12).

Email: Eric.Cowan@cranfield.ac.uk