

Emerging issues: Pharmaceutical pollution

What happens in extreme weather conditions?



Pharmaceutical use is ubiquitous



Pathway into the environment





Why does it matter?

- Eco-toxic effect on aquatic organisms
- Antimicrobial resistance
 - Presence of antibiotic residue gives a selective advantage to resistant bacteria





In the presence of an antibiotic, susceptible strains are killed; the resistant strain survives. The resistant strain proliferates and may be capable of causing a new infection.

Image from: Jaana, 2014. What is antibiotic resistance and why does it matter? [Online] Mostly Science. Available from: https://mostlyscience.com/2014/06/antibiotic-resistance/





Environmental Risk



$Risk \ Quotient = \frac{Predicted \ Environmental \ Concentration}{Predicted \ No - Effect \ Concentration}$

 $PEC = \frac{Total \ weight \ of \ drug \ consumed \ per \ annum \ x \ fraction \ excreted \ x \ (1 - fraction \ removed)}{365 \ x \ population \ x \ wastewater \ per \ day \ per \ household \ x \ environmental \ dilution}$



Consumption is increasing



- Growing population
- Ageing population
- New medicines
- 'New' diseases



Dilution – SEPA River Level Data



Conclusion?



- If we expect low flows more frequently and for longer periods of time, it would be prudent to rationalise pharmaceutical consumption
- Green One Health Breakthrough Partnership: multi-agency partnership exploring options for the reduction of pharmaceutical pollution



Thank you for your attention

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