CROWD: Clean Rivers of West Dorset

What progress has the Environment Agency made with assessing risks to human health from exposure to pathogens in beach sand (as highlighted by the World Health Organization in 2021) and the need to add this evaluation to its monitoring of bathing waters?

Background

a. The EA reported in 2009 that high levels of faecal bacteria may occur under seaweed on beaches and suggested more work was required[1,2].
b. More recently, international collaboration has established the multi-dimensional issue for human health from the hazards of a range of pathogenic bacteria, protozoa, viruses and helminths in some beach sands. They arise from human activities such as agriculture and sewage disposal (allochthonous)[3,4,5,6,7] or occur naturally in the sand environment (autochthonous)[4].
c. The US Environmental Protection Agency (EPA) is aware of the issue and offers public guidance[8].
d. WHO[9] recommends that sampling for microorganisms in sand should be considered for inclusion in regulatory programmes.
e. An EU public consultation has revealed that pathogens in beach sand were considered very important by over 50% of respondents[10]. Portugal[4] is now monitoring beach sand as well as bathing waters for human safety issues at its Blue Flag sites.
f. The Maritime & Coastguard Agency does not consider biological hazards in its document on beach safety[11].

Selected references

1. The Environment Agency (2009). 'The potential risks to human health posed by living, attached seaweeds and dead, beach-cast material associated with sandy beaches: a preliminary report'
2. Quilliam, R.S. *et al*. (2014) 'Seaweeds and plastic debris can influence the survival of faecal indicator organisms in beach environments'. *Marine Pollution Bulletin* **84**, 201–207
3. Beversdorf, L.J. et al., (2007). 'The potential for beach sand to serve as a reservoir for *Escherichia coli* and the physical influences on cell die-off'. *Journal of Applied Microbiology* **102**, 1372–1381
4. Brandão, J. *et al*. (2023). Strategies for monitoring microbial life in beach sand for protection of public health. *Int J Environ Res Public Health*, 20, 5710
5. Conrad J.W. and Harwood V.J. (2022) 'Sewage promotes *Vibrio vulnificus* growth and alters gene transcription in *Vibrio vulnificus* CMCP6'. *Microbiology Spectrum* **23**, e0191321
6. Rodrigues, A. *et al*., (2019) 'Colonisation of plastic pellets (nurdles) by *E. coli* at public bathing beaches'. *Marine Pollution Bulletin* **139** 376–380
7. Malham, S.K. *et al*. (2014) 'The interaction of human microbial pathogens, particulate material and nutrients in estuarine environments and their impacts on recreational and shellfish waters'. *Environ. Sci.: Processes Impacts* **16**, 2145-2155
8. EPA (2023) 'What Affects Human Health at the Beach'
9. WHO (2021). Guidelines on recreational water quality: Volume 1 Coastal and Fresh Waters. Guidelines on recreational water quality: Volume 1 coastal and fresh waters
10. EU (2023). Bathing water quality – review of EU rules
11. The Marine and Coastguard Agency (2019) Managing_Beach_Safety_guidance