Journal of Applied Microbiology , 2023, 134 , 1–17
https://doi.org/10.1093/jambio/lxad166
Advance access publication date: 29 July 2023
Research Article

Fate of microbial contamination in a South European Coastal Lagoon (Ria Formosa) under the influence of treated effluents dispersal

Sandra Caetano[1,2,*], Cátia Correia[1], Ana Flor Torres Vidal[1], André Matos[1], Cristina Ferreira[1], Alexandra Cravo[1,3]

[1] CIMA, Centre of Marine and Environmental Research/ARNET—Infrastructure Network in Aquatic Research, University of Algarve, Campus
de Gambelas, 8000-139 Faro, Portugal
[2] School of Health (ESS), University of Algarve, Escola Superior de Saúde da Universidade do Algarve, Campus de Gambelas, Edifício 1, Piso
3, 8005-139 Faro, Portugal
[3] Sciences and Technology Faculty (FCT), University of Algarve, Faculdade de Ciências e Tecnologia, Campus de Gambelas, Edifício 7,
8005-139 Faro, Portugal
*Corresponding author. CIMA, Centre of Marine and Environmental Research/ARNET—Infrastructure Network in Aquatic Research, University of Algarve,
Campus de Gambelas, 8000-139 Faro, Portugal. E-mail: smcaetano@ualg.pt

Abstract

Aim: Assessment of the fate of microbial contamination driven from treated wastewater disposal at a highly productive zone on a South European coastal lagoon (Ria Formosa).

Methods and results: Microbial indicators of contamination (Tot al coliforms, *Escherichia coli*, and Enterococci) were evaluated monthly during September 2018–September 2020 at three study areas (Faro, Olhão, and Tavira) under different wastewater discharge flows and hydrodynamic conditions. Additional data on *E. coli* monitoring in bivalves, available from the national institution responsible for their surveillance was also considered. The maximum microbial contamination was found at Faro, the highest-load and less-flushed study area, contrasting the lowest contamination at Olhão, a lo w er-load and strongly flushed area. The wastewater impact decreased along the spatial dispersal gradients and during high water, particularly at Faro and Tavira study areas, due to a considerable dilution effect. Microbial contamination at Olhão increased during the summer, while at the other study areas seasonal evidence was not clear. Data also indicate that *E. coli* in bivalves from bivalve production z ones next to the three study areas reflected the differentiated impact of the wastewater treatment plants effluents on the water quality of those areas.

Conclusions: Effluent loads together with local hydrodynamics, water temperature, solar radiation, precipitation, and land runoff as well as seabirds populations and environmentally adapted faecal or renaturelized bacterial communities, contributed to microbial contamination of the study areas.

Significance and impact of study:

This study contributes to the protection and management of coastal lagoons, important ecosystems with high socio-economic relevance, as it provides essential knowledge regarding the spatial, temporal, and tidal trends of water microbial contamination with impact on bivalves and ultimately on public health. Moreo v er, these data support the need for continuous microbial contamination monitoring of water and bivalves from coastal lagoons worldwide.

Keywords: *Escherichia coli*, coastal lagoons, Ria Formosa, microbial contamination, treated wastewater