

Contribution of the Anthropically – Impacted aquatic Ecosystems to the Resistance Reservoir

Alina MANOLE^{1,*}, Mihaela Ioana JAGĂ^{1,2,*}, Ecaterina SÂRBU^{1,2,*},
Mariana Carmen CHIFIRIUC^{1,3,4}, Carmen POSTOLACHE²,
Luminița Gabriela MĂRUȚESCU^{1,3}

¹University of Bucharest, Faculty of Biology, Doctoral School of Biology, Romania.

²University of Bucharest, Faculty of Biology, Doctoral School of Ecology, Romania.

³Microbiology Immunology Department, Faculty of Biology, The Research Institute of the University of Bucharest, University of Bucharest, Romania

⁴Academy of Romanian Scientists, Bucharest, Romania. *corresponding authors e-mail address: manolea@colegiul-cantacuzion.ro; ioana.mihaela.jaga@drd.unibuc.ro

Abstract. Aquatic ecosystems are reservoirs of antibiotic-resistant bacteria (ARB) and antibiotic resistance genes (ARGs), having a major role in their occurrence, accumulation and dissemination. The purpose of this review is to highlight the influence of wastewater treatment plants (WWTP) effluents, manure and biosolids use in agriculture as well as of aquaculture upon the development of antibiotic resistance (AR). Research indicates the need to streamline treatment strategies in order to minimize the risk of AR spread in the aquatic environment through wastewater.

Keywords: *Antibiotic resistance, antibiotic-resistant bacteria, antibiotic resistance genes, wastewater treatment plants.*

Introduction

Throughout the world, in recent decades, after the *golden age* of antibiotics, their excessive consumption, both in human therapy and in animal husbandry, has led to the development and enrichment of different media in antibiotic-resistant bacteria (ARB) and antibiotic resistance genes (ARGs) (Doma et al., 2015).

The World Health Organization (WHO) classified antibiotic resistance (AR) as one of the three most important threats to public health (Chen et al., 2017; Alexiu, 2019), causing hundreds of thousands of deaths annually (WHO, 2019). The European Commissioner for Health and Food Safety, Vytenis Andriukaitis, claims that in the EU, around 25,000 deaths a year are caused by rising AR. He states that AR “*is a global problem that needs a global solution. Unfortunately, the accumulation of factors - especially the excessive and inappropriate use of antibiotics and poor infection control practices - has progressively turned AR into a massive threat to humanity. The increase in AR and the lack of preventive measures can lead to a return to the pre-antibiotic era, when people died from*