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A new paragon for sustainable aquaculture

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Antimicrobial Resistance in Aquaculture: Challenges and Alternatives in the Context of Global Warming

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Abstract

Aquaculture provides nowadays half of the world's seafood consumption and it is expected to expand since wild fisheries will remain stable at best. Considering the importance of aquaculture for contributing to food security over the world, producers will have to meet challenging goals to make aquaculture more sustainable and productive in the future context of the global warming. The extensive use of antibiotics to prevent and treat livestock diseases over the world, and in some countries for livestock growth promotion, has been associated with the emergence and spread of resistant bacteria to antibiotics through the food chain and the environment, which pose a threat to both human and animal health. The situation is alarming in the food-producing animal sector, including aquaculture, due to the use of antibiotics that are common to human health and the lack of investment in developing new effective antimicrobials. Up to 80% (O-Neill 2015[1]) of antibiotics, generally administered to fish in feed, are released in water and sediments, where they exert a selective pressure on the microbial communities of the aquatic environment. Thus, AMR has become one of "the most urgent global risks" (UN General Assembly 2016[2]) highlighting the importance of international cooperation in tackling AMR at global level by preventing microbial infections and their spread; developing alternatives for treatments; cooperating with international partners to contain the risks of AMR; promoting research and innovation and improving communication and training. It is thus important to measure the full implications of environmental changes on the sustainability of aquaculture. We performed, a meta-analysis (481 articles) to explore how global warming and antimicrobial resistance

(AMR) impacts aquaculture, and found that aquaculture-derived Multi-Antibiotic Resistance (MAR) indices correlate with MAR indices from clinical bacteria, temperature and countries' climate vulnerability. We also observed that infected aquatic animals present higher mortalities at warmer temperatures. Countries most vulnerable to climate change, which are also the most important producer countries for aquaculture, will probably face the highest AMR risks, impacting human health beyond the aquaculture sector, highlighting the need for urgent action. In this regard, solutions to minimize antibiotic use and increase system resilience like using plants are necessary for promoting sustainable alternatives based on the local biodiversity.

[1] https://amr-review.org/sites/default/files/Antimicrobials%20in%20agriculture%20and%20the%20environment%20-%20Reducing%20unnecessary%20use%20and%20waste.pdf

[2] https://www.who.int/antimicrobial-resistance/events/UNGA-meeting-amr-sept2016/en/