AQUACULTURE AT THE CROSSROADS OF GLOBAL WARMING AND ANTIMICROBIAL RESISTANCE AND THE USE OF BIOACTIVE PLANTS AND ALGAE AS A SUSTAINABLE ALTERNATIVE

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Considering aquaculture's importance in global food security, it is key to fully understand the risks this sector might face in the light of global change. Aquatic animal diseases are one of the major limiting factors in aquaculture development, yet it is poorly understood how their emergence and severity might change with global warming. Furthermore, the extensive use of antibiotics to prevent and treat such diseases has been associated with the emergence and spread of antibiotic resistance (AMR) bacteria, posing a serious threat to global health. Our research has focused on trying to understand how the aquaculture sector will be impacted by these global threats and we found that aquaculture-derived Multi-Antibiotic Resistance (MAR) indices correlate with MAR indices from human clinical bacteria, temperature, and countries' climate vulnerability (Figure 1). We also observed that infected aquatic animals present higher mortalities at warmer temperatures. These results suggest that countries most vulnerable to climate change, will probably face the highest losses in aquatic animals together with the highest AMR risks, highlighting the need for urgent action. In this regard, sustainable solutions to minimize antibiotic use and increase system and animal resilience (i.e. OneHealth approaches) like using functional feeds (e.g. bioactive plants) are urgently needed. We previously found that the red algae *Asparagopsis taxiformis* increased the expression of two immune-related genes in the orbicular batfish and displayed antibacterial properties against fish pathogens such as *Tenacibaculum* bacteria. More recently, we performed a meta-analysis and observed that plant-enriched diets significantly increased fish growth, immunity parameters and disease resistance. Interestingly, these effects were overall conserved regardless of the fish trophic level, treatment duration and type of plant material used (i.e. powder or extract).

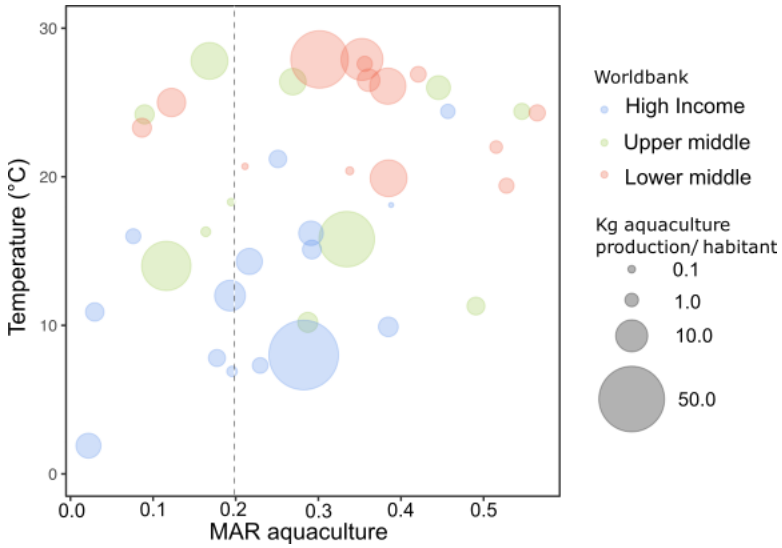

Figure 1. Correlations between the MAR from aquaculture-related bacteria and environmental temperature.