



Analysing the Genes Associated with Antimicrobial Resistance in Bangladeshi Aquaculture Ponds

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DESCRIPTION

Aquaculture, surface runoff from agriculture, and wastewater effluent are only a few of the sources where antibiotics from diverse anthropogenic activities infiltrate freshwater systems. As a result, antibiotic effectiveness has decreased as organisms gain antimicrobial resistance genes, which has contributed to the developing issue of Antimicrobial Resistance (AMR). The rising incidence of infectious diseases, combined with our overuse of antibiotics in the absence of efficient infectious disease control, and the dearth of viable alternative treatment options, have all been blamed for a large portion of the AMR problem. The AMR epidemic is predicted to cost the global economy \$100 trillion by 2050 and result in the yearly loss of 10 million lives if it is not solved. National action plans with measures to decrease or eliminate AMR have been put into place as a result of the AMR crisis. Strategies to lower or lessen AMR risks, such as One Health action plans, are essential in battling the rise in AMR rates. Reducing the dangers of AMR in the food industry, which uses around two-thirds of all antibiotics globally, is a crucial component of these action plans [1].

For a growing global human population, aquaculture has been identified as a major contributor to the production of sustainable proteins. Aquaculture is primarily practiced in Low-and Middle-Income Countries (LMICs) in Asia. This includes Bangladesh, whose aquaculture sector has an average annual growth rate of 10% over the past ten years and supplied 3% of the world's total fish production by weight. Aquaculture now accounts for more than half of Bangladesh's finfish production, with carp, tilapia, and phantasies species predominating. Carp include Indian and alien species [2]. Because to the small-scale earthen embankment ponds that make up Bangladesh's traditional and rural aquaculture farms and are directly tied to their local environment, diseases are rather widespread. Also, during the drier months, untreated groundwater and untreated precipitation are mostly used to fill these traditional clay fish ponds. Aquaculture ponds undergo a fallow time on a rotating

basis where they are dried, limed to reduce acidity, disinfected using bleach, and every two to three years, sludge from the pond bottom is removed in an effort to lower the incidence of disease. Bangladesh's aquaculture sector is rapidly expanding in order to keep up with increased global demand for animal products and domestic economic growth ambitions. However, the industry is experiencing an increase in disease incidences from pathogens like *Pseudomonas* and *Aphanomyces* species leading to fin and tail rot, epizootic ulcerative syndrome, and increase mortalities because of the lack of infrastructure or resources to support bio-secure intensification [3].

This is endangering the livelihoods of the 15 million people who depend on this industry. It is normal practice to provide antibiotics to ponds in order to treat and prevent disease. According to studies, antibiotics are also still used as growth promoters, which are intended to inhibit bacteria that may otherwise limit fish growth [4]. The socioeconomic factors that contribute to the overuse of antibiotics in Bangladeshi fisheries are complex and multifaceted, and farmers there face difficulties as a result of rising disease burdens, unstable and low market prices, poor source water quality, and limited access to sustainable practices and disease management training. Antibiotics can enter ponds from a number of different places, the most notable of which is the suspicious utilization of antimicrobials in advertising fish feeds, where they're added to prevent spoilage or through pond water contamination from antibiotic-treated human and animal waste from the wider pond environment. Reports indicate that antibiotics are frequently applied to ponds at doses higher than those recommended and without finishing the full course of treatment to treat diseases, factors that are linked to the development of AMR. Antibiotics are inexpensive and easily accessible over the counter without a prescription in Bangladesh. Typically, fish farm water is dumped into the same water body that supplies it without being treated, which results in increased antibiotic concentrations at downstream sites [5].

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