CONTACT - Consequences of Antimicrobials and Antiparasitics Administration in Fish Farming for Aquatic Ecosystems

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Introduction:

Human population expansion is accompanied by a worldwide increase in needs for food with the challenge to maximize production yields while minimizing negative impacts on the environment. Transition towards high-protein diet further fosters the increase in protein demand and the intensification of production systems, particularly in low- and middle-income countries . Aquaculture is considered one of the most sustainable sources of animal protein and currently accounts for around 10% of all animal protein consumed globally, expected to increase by 50% by 2030. In this context, aquaculture provides nearly half of the world`s food fish supply with a production valued at over US$250 billion. **However, this intensification and increase in production is accompanied by the massive use of multiple antimicrobials and further veterinary drugs such as antiparasitics to either fight or prevent the spread of pathogens, or as surrogates for hygiene on farms** .

Hypothesis:

1) As a consequence of antimicrobials administration in aquaculture we expect **spread of ARGs and MGEs** into the aquatic environment and throughout all trophic layers.
2) The spread of AMR is accompanied by **shifts in the structure and function** of free-living microbiomes as well as specific host –microbe interaction patterns.
3) Community shifts and **reduction of diversity** throughout the different trophic levels (e.g. productivity loss of endemic water plants or animals, invasion and prevalence of neophytes and non-native animal species) could occur.
4) Co-selection of ARGs and MGEs due to administration of antiparasitics and other confounding factors such as disinfectants or heavy metals is likely to happen.
5) A faster spread in warmer climatic regions due to higher turnover and productivity and
6) Differences between freshwater and marine systems can be expected.

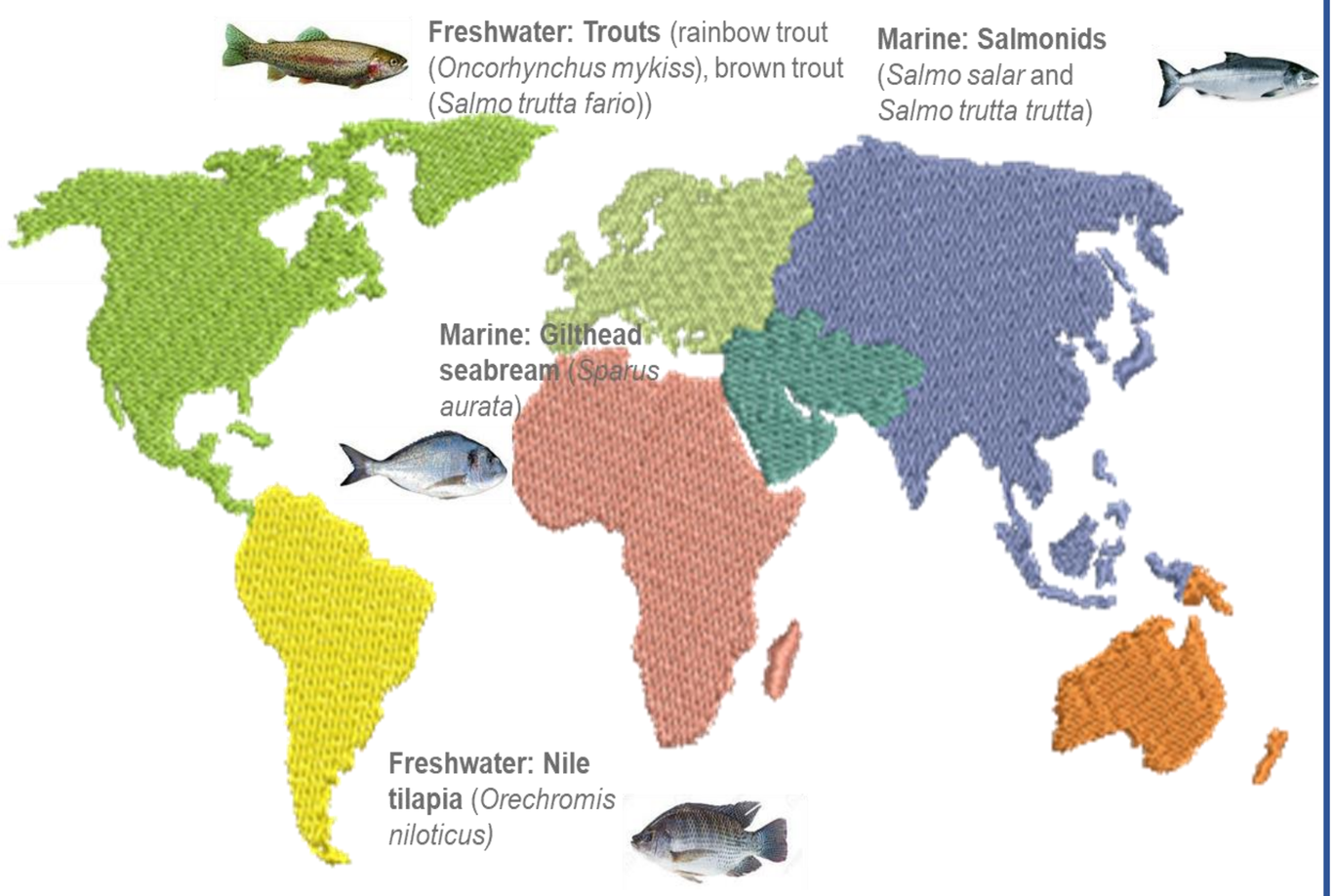
Aim and objectives:

The **aim** of our project is **to improve our understanding on the consequences of antimicrobials on ARG emergence and dissemination from aquaculture activity into the aquatic ecosystems** with special respect to
a) major routes of entry,
b) hotspots of emergence and spread
c) potential co-selection

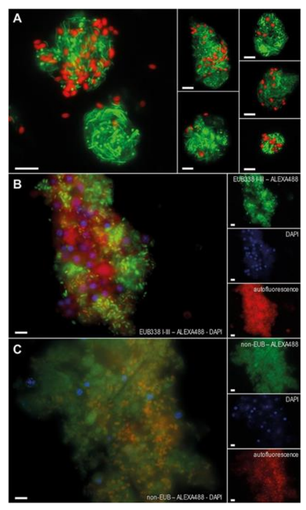
Working packages:

WP1: Project Coordination
WP2: Experiments and Monitoring
WP3: Consequences for target microbiota
WP4: Consequences for non-target organisms
WP5: Mitigation strategies
WP6: Dissemination

Showcases:



Non target species:



sediment microbiota


The microbiome of the mussel *Unio crassus* (Germany)


The microbiome of the mussel *Limniperna fortunei* (Brazil)


The microbiome of the cucumber *Psolus phantapus* (Norway)


The microbiome of the urchin *Echinoidea* (Norway)

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