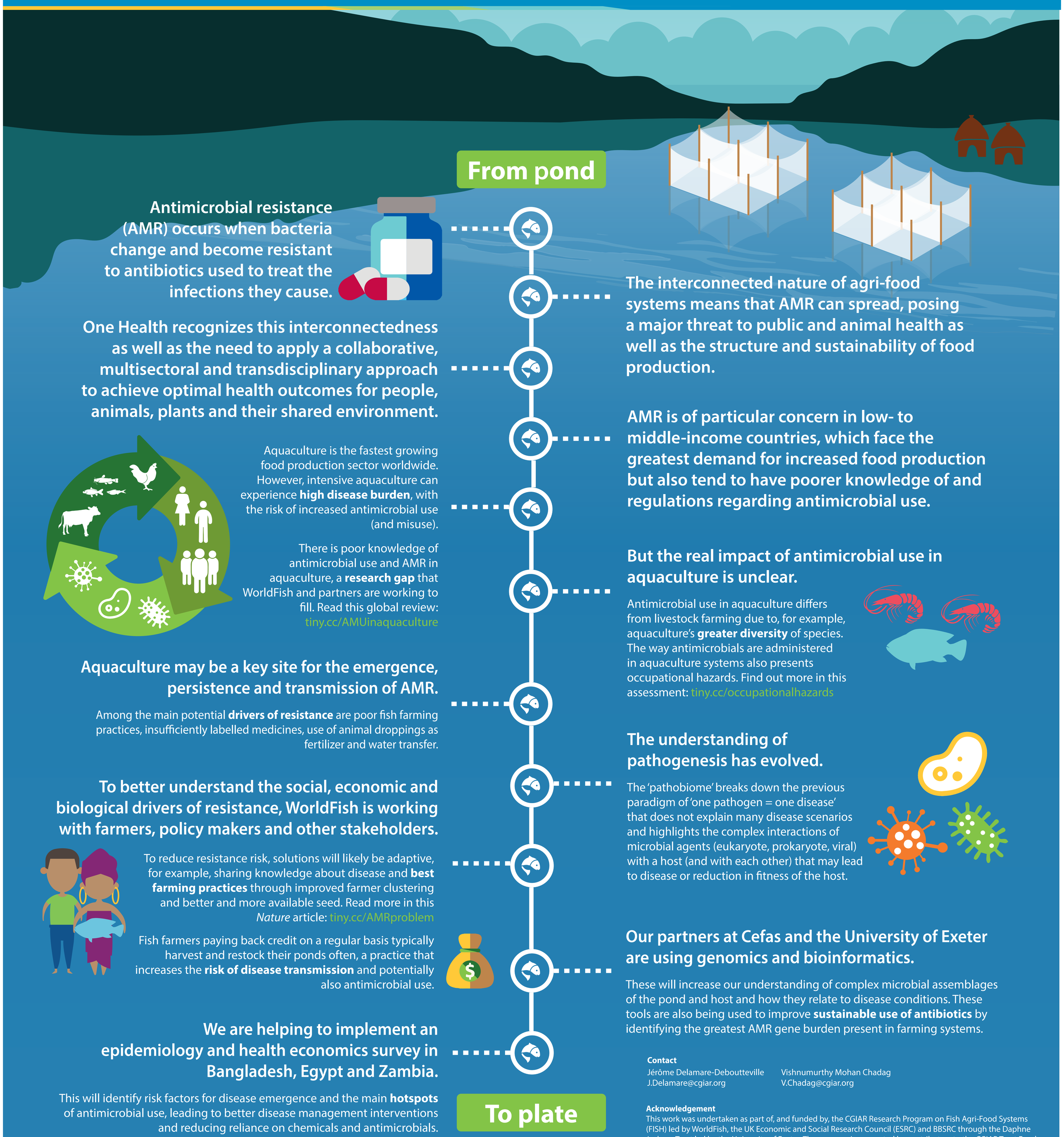
Why antimicrobial resistance in aquaculture systems matters for the One Health approach



Antimicrobial resistance (AMR) occurs when bacteria change and become resistant to antibiotics used to treat the infections they cause.

One Health recognizes this interconnectedness as well as the need to apply a collaborative, multisectoral and transdisciplinary approach to achieve optimal health outcomes for people, animals, plants and their shared environment.

Aquaculture is the fastest growing food production sector worldwide. However, intensive aquaculture can experience **high disease burden**, with the risk of increased antimicrobial use (and misuse).

There is poor knowledge of antimicrobial use and AMR in aquaculture, a **research gap** that WorldFish and partners are working to fill. Read this global review: tiny.cc/AMUinaquaculture

Aquaculture may be a key site for the emergence, persistence and transmission of AMR.

Among the main potential **drivers of resistance** are poor fish farming practices, insufficiently labelled medicines, use of animal droppings as fertilizer and water transfer.

To better understand the social, economic and biological drivers of resistance, WorldFish is working with farmers, policy makers and other stakeholders.

To reduce resistance risk, solutions will likely be adaptive, for example, sharing knowledge about disease and **best farming practices** through improved farmer clustering and better and more available seed. Read more in this *Nature* article: tiny.cc/AMRproblem

Fish farmers paying back credit on a regular basis typically harvest and restock their ponds often, a practice that increases the **risk of disease transmission** and potentially also antimicrobial use.

We are helping to implement an epidemiology and health economics survey in Bangladesh, Egypt and Zambia.

This will identify risk factors for disease emergence and the main **hotspots** of antimicrobial use, leading to better disease management interventions and reducing reliance on chemicals and antimicrobials.

The interconnected nature of agri-food systems means that AMR can spread, posing a major threat to public and animal health as well as the structure and sustainability of food production.

AMR is of particular concern in low- to middle-income countries, which face the greatest demand for increased food production but also tend to have poorer knowledge of and regulations regarding antimicrobial use.

But the real impact of antimicrobial use in aquaculture is unclear.

Antimicrobial use in aquaculture differs from livestock farming due to, for example, aquaculture's **greater diversity** of species. The way antimicrobials are administered in aquaculture systems also presents occupational hazards. Find out more in this assessment: tiny.cc/occupationalhazards

The understanding of pathogenesis has evolved.

The 'pathobiome' breaks down the previous paradigm of 'one pathogen = one disease' that does not explain many disease scenarios and highlights the complex interactions of microbial agents (eukaryote, prokaryote, viral) with a host (and with each other) that may lead to disease or reduction in fitness of the host.

Our partners at Cefas and the University of Exeter are using genomics and bioinformatics.

These will increase our understanding of complex microbial assemblages of the pond and host and how they relate to disease conditions. These tools are also being used to improve **sustainable use of antibiotics** by identifying the greatest AMR gene burden present in farming systems.

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