

# Understanding microbiomes in cultured tilapia for disease prediction and mitigation strategies

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## Introduction

1. Aquaculture is hugely important to global food security, especially in Low-Income and Food-Deficit countries like Bangladesh.



3. In 2017, tilapia aquaculture production was 5.7 million tonnes, with an industry value of \$11 billion<sup>1</sup>.



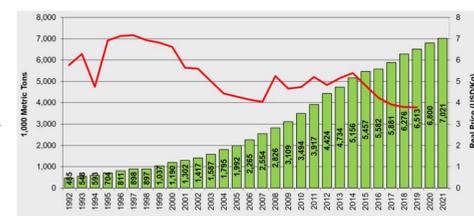
5. Disease outbreaks is the major threat of this industry with an economic impacts of around \$100 million<sup>3</sup>.



2. Tilapia are the second most important aquaculture species globally.



4. Tilapia contributes around 9% of total annual fisheries production<sup>2</sup>.



Global production of farmed tilapia with representative US import price for frozen fillets (red Line)

6. Stressors that induce microbial shifts associated with increased disease and infection in human are well known but almost nothing is known in this regard for fish.

## Aim of the project

Aim of this project is to isolate and identify microbiomes on tilapia skin and gills and their pond environments, understanding their role relating to fish health, and predict for possible disease outbreaks in culture ponds, in turn informing possible intervention strategies to reduce losses in aquaculture systems.

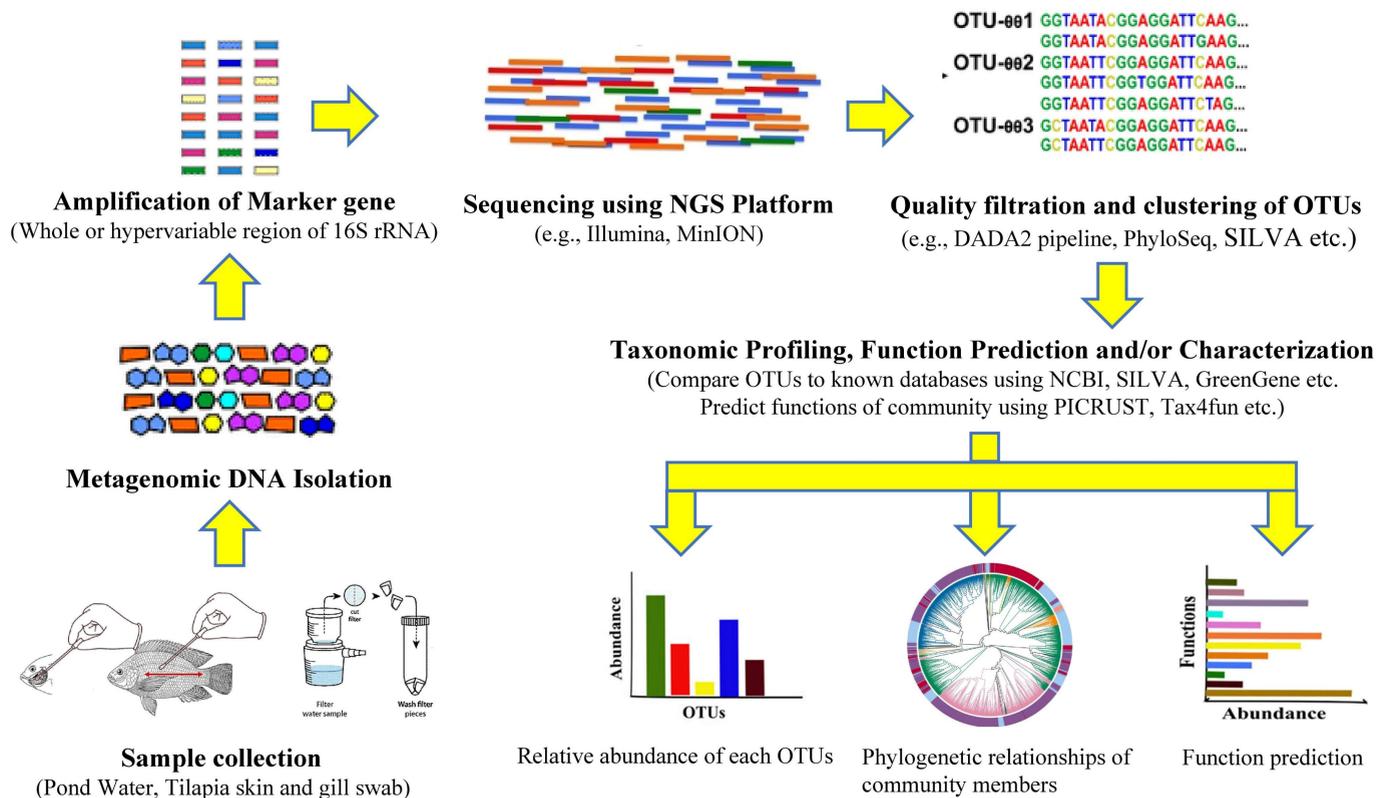
## Research questions

1. How does microbiomes shift in aquaculture system?
2. How this microbial shift cause disease in fish?
3. Can we predict a disease outbreak looking at these microbiome shift in the aquaculture pond?
4. Is it possible to use pond microbiomes in tilapia aquaculture systems to signal for environments conducive for good health and those that signal for impending disease outbreak?

## Possible outcomes of the research

1. Detailed understanding of fish microbiomes and their role in fish disease which is least studied compared to human microbiomes.
2. By understanding the pattern of microbial shifts in fish and pond environment, being able to predict possible disease outbreak.
3. Reduce economic loss caused by fish disease outbreak.

## Method outline



## References

- <sup>1</sup>Barroso, R.M., Muñoz, A.E.P. and Cai, J. (2019) Social and economic performance of tilapia farming in Brazil. FAO Fisheries and Aquaculture Circular No. 1181, 2070-6065, Rome.
- <sup>2</sup>Shamsuzzaman, M.M., Islam, M.M., Tania, N.J., Abdullah Al-Mamun, M., Barman, P.P. and Xu, X. (2017) Fisheries resources of Bangladesh: Present status and future direction. Aquac Fish 2, 145-156.
- <sup>3</sup>Fathi, M., Dickson, C., Dickson, M., Leschen, W., Baily, J., Muir, F., Ulrich, K. and Weidmann, M. (2017) Identification of Tilapia Lake Virus in Egypt in Nile tilapia affected by 'summer mortality' syndrome. Aquaculture 473, 430-432

