# Translating circular economy principles to aquaculture

Killian Chary, Anne-Jo van Riel, Ramon Filgueira, Aurélie Wilfart, Souhil Harchaoui, Abigail Muscat, Marc Verdegem, Imke de Boer, Geert Wiegertjes

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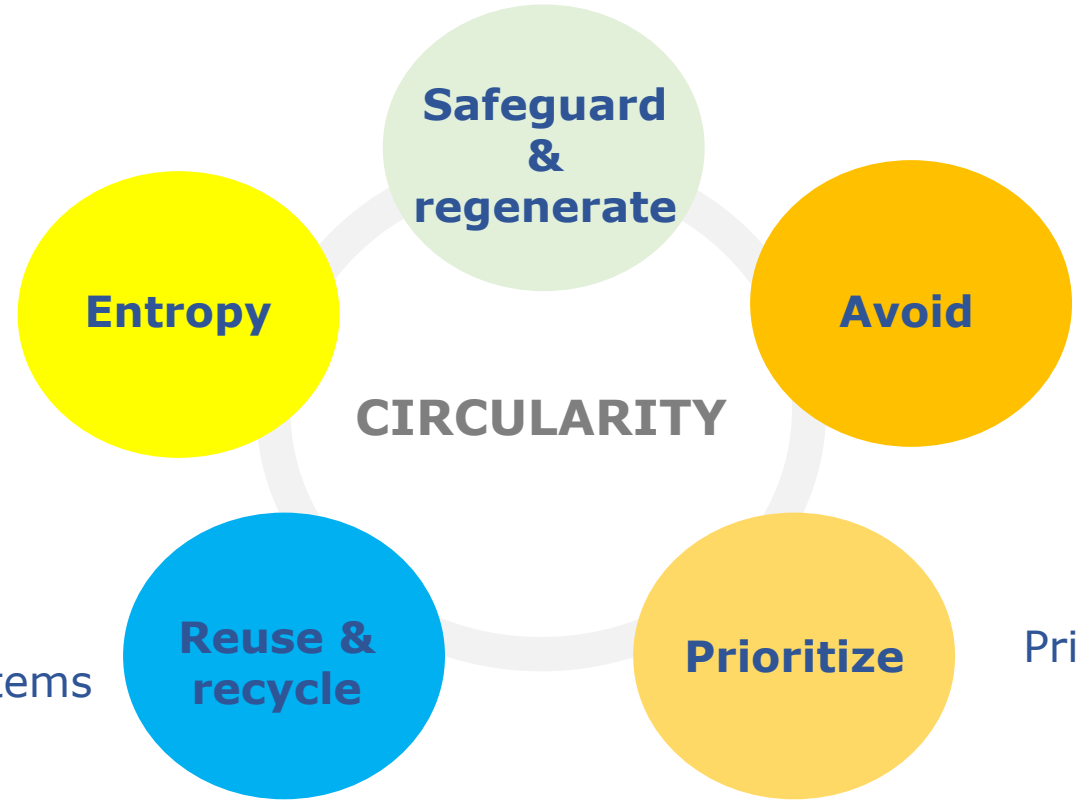
Session Biosphere - Towards circular marine food production | Sustainable mariculture

# Introduction and context

- Food production is causing major global environmental burdens
- Circular economy (CE) as a tool for more sustainability
- CE research focused on terrestrial food productions
- What does circularity mean for aquaculture?

# Overview of the 5 ecological principles

Safeguarding and regenerating the health of our (agro)ecosystems




Using renewable energy while minimizing overall energy use

Avoiding non-essential products and the waste of essential ones

Utilizing and recycling by-products of (agro)ecosystems

Prioritizing biomass streams for basic human needs

Adapted from Muscat et al. 2021

# Principle 1: Safeguard and regenerate

# Safeguard ressource ecosystems

**Safeguard & regenerate**

## Inputs

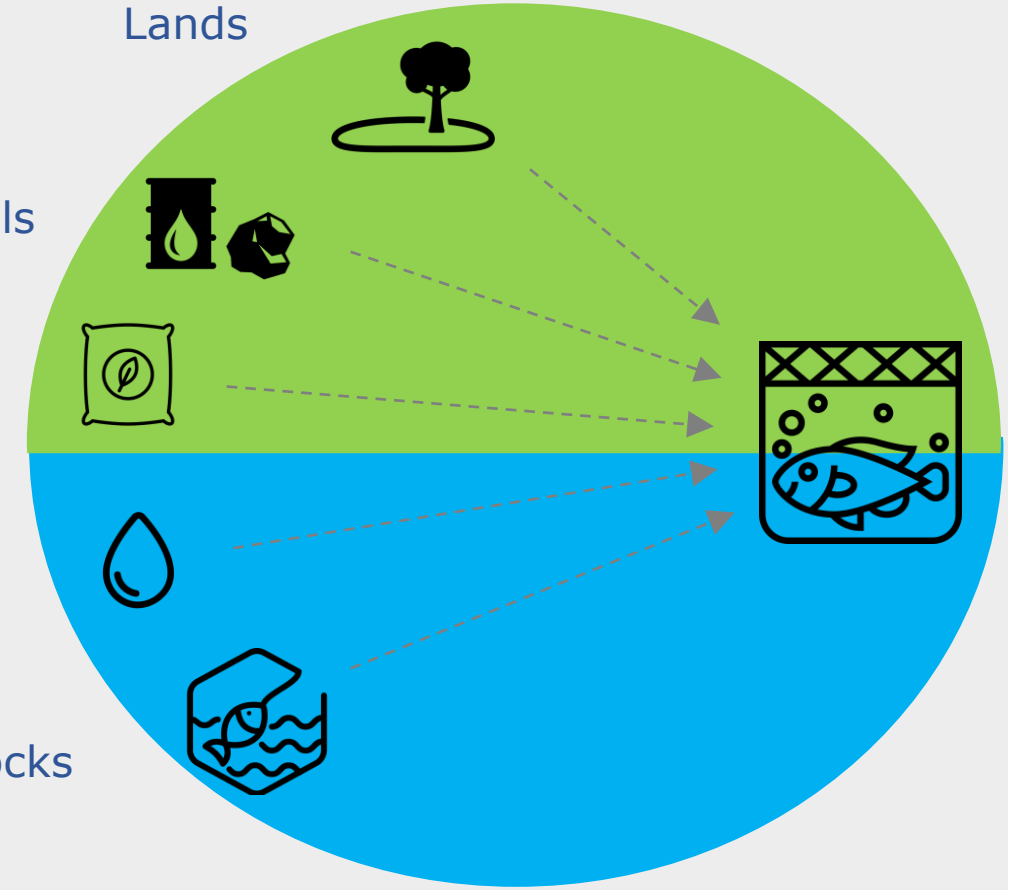
Lands

Fossil fuels

Fertilizer

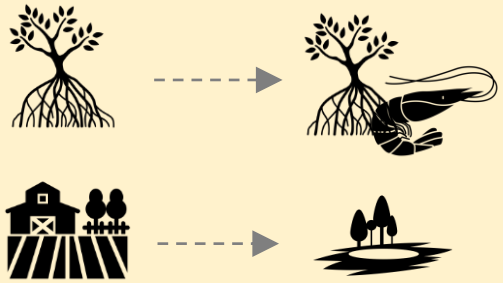
Water

Wild stocks



## Issue

Habitat destruction due to land use change



Overfishing

## Implications

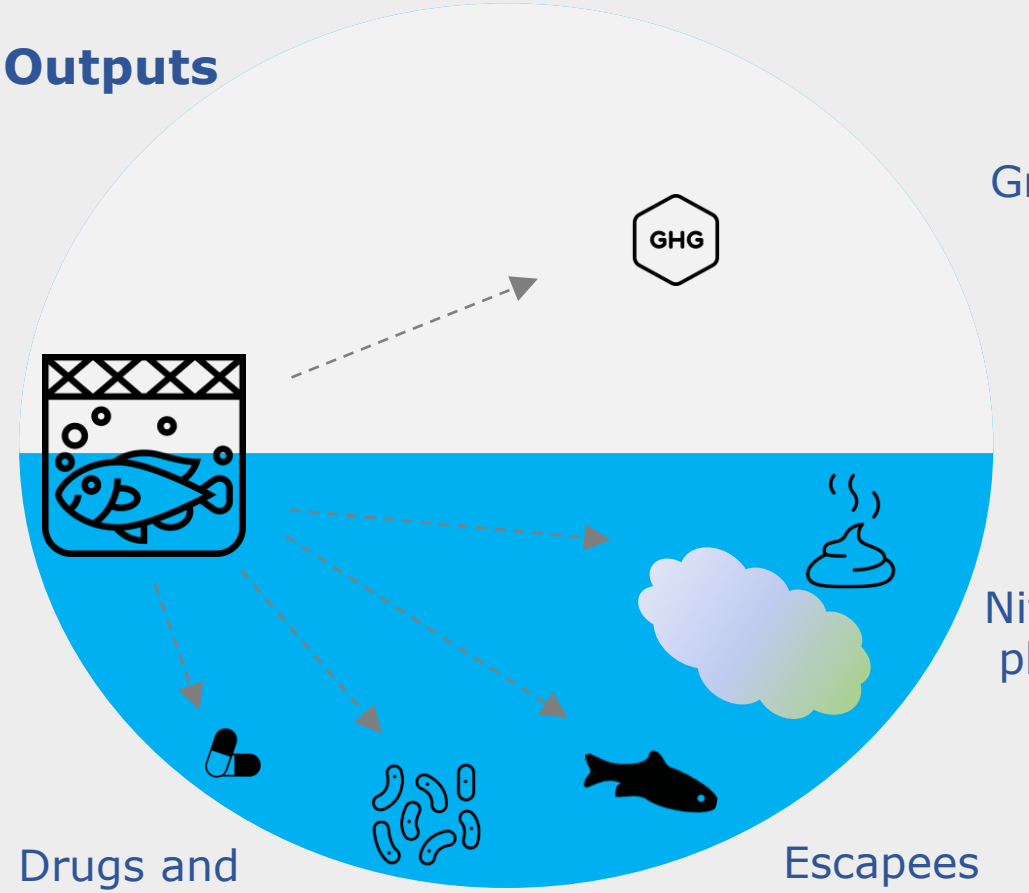
Avoid conversion of ecologically valuable ecosystems

Source from well managed stocks

# Safeguard receiving ecosystems

**Safeguard & regenerate**

## Outputs




Greehouse gas

Nitrogen and phosphorus

Drugs and chemicals

Pathogens and parasites

Escapees

## Issues

Eutrophication

Genetic pollution and and invasive species

## Implications

Amount of aquaculture limited by the ecosystem assimilative capacity

Use only native species/strains

# Principle 2: Avoid

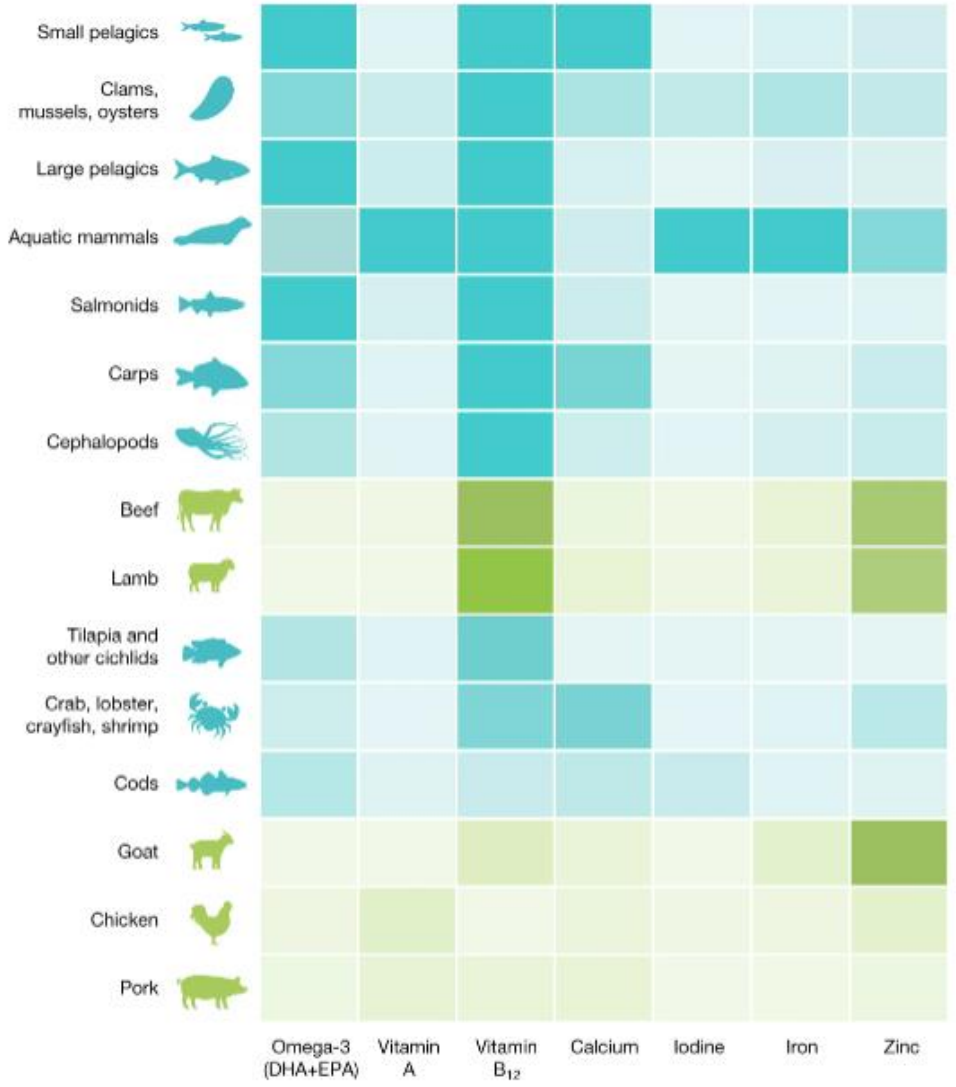
# Avoid non essential production

Avoid

## What makes aquatic foods essential?

### Nutrition
- Source of protein
- Source of essential fatty acids (PUFA)
- Iron, zinc, Vit. A, B12

### Food security
- Source of affordable and accessible food and nutrients
- Source of jobs and income




Nutrient richness

Adapted from Golden et al. 2021

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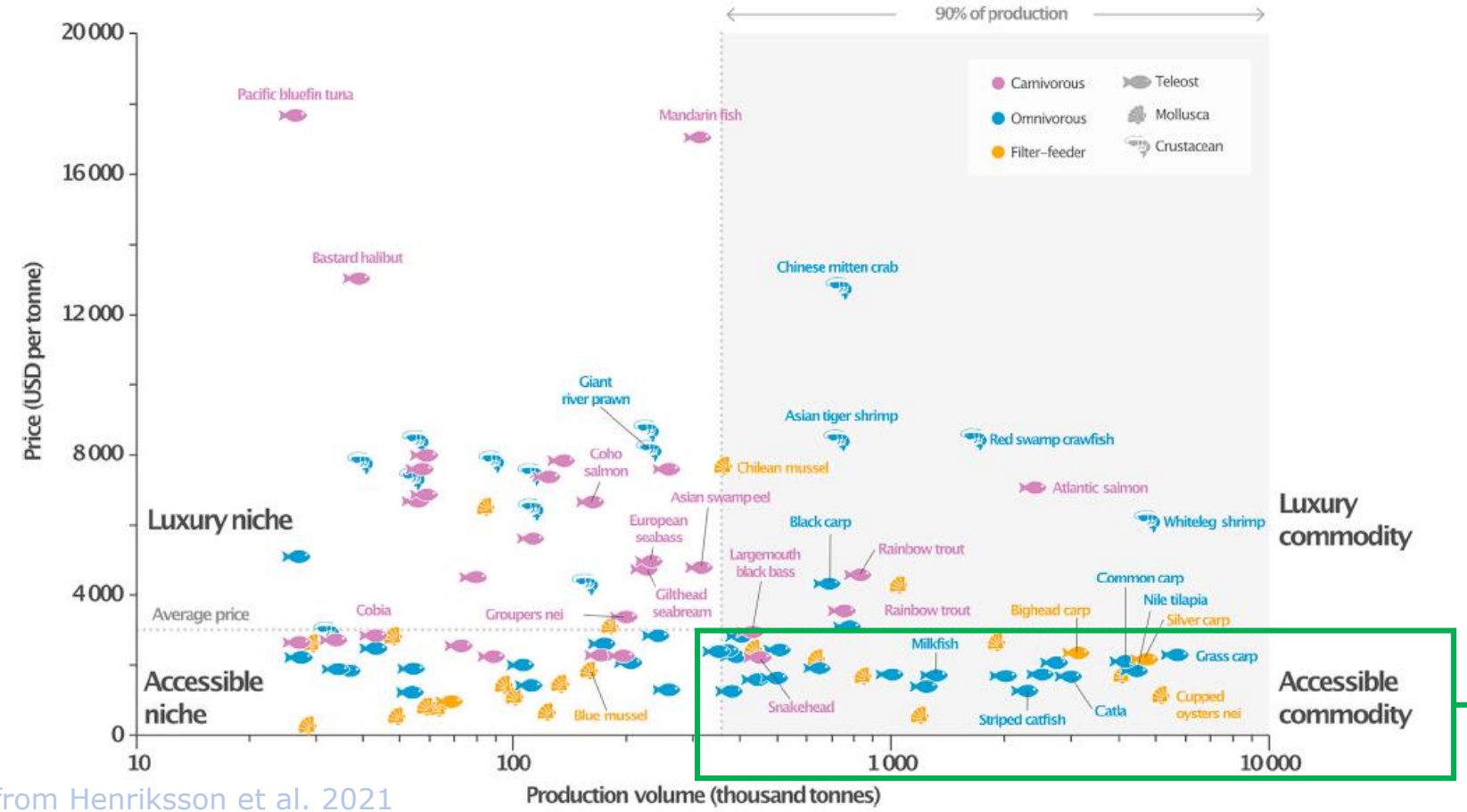
# Avoid non essential production

Avoid

## Are all aquaculture products equally essential?




Adapted from Henriksson et al. 2021

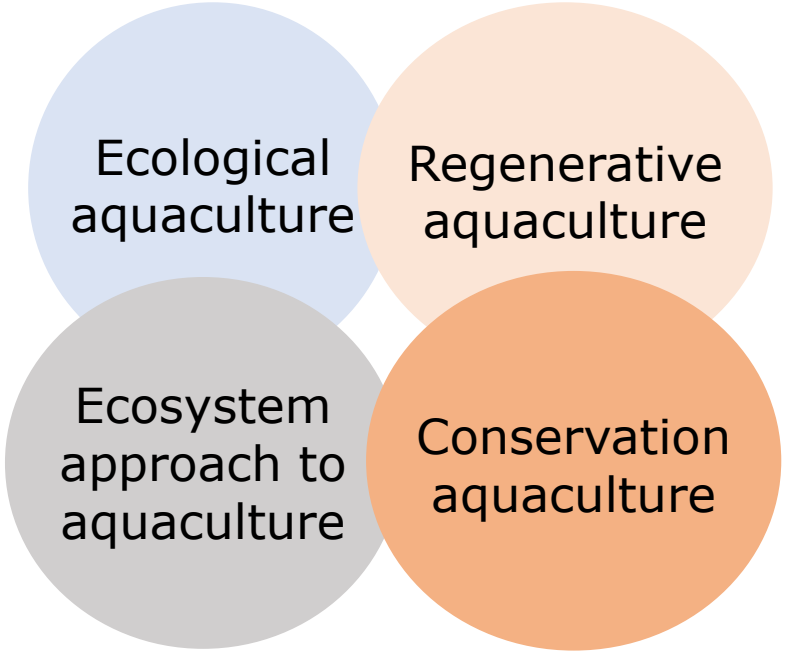
### Implications

Avoid/Reduce the production of species which contribute little to food and nutrition security


Species that contribute to food security

# Next steps

- Build narratives to promote circularity in aquaculture
- Check coherence and novelty with sustainability schemes used in aquaculture

# Thank you !

## Contact information



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