

# *Carp in the global aquaculture scene*

**Béla Halasi-Kovács, PhD**  
director of MATE-HAKI

6<sup>th</sup> International Carp Conference  
31<sup>st</sup> of August 2023, Szarvas, Hungary

The logo for MATE (Hungarian University of Agriculture and Life Sciences) consists of the word "MATE" in a bold, blue, sans-serif font. The letters are stylized with a white outline, and the "A" and "E" have a unique, geometric design.

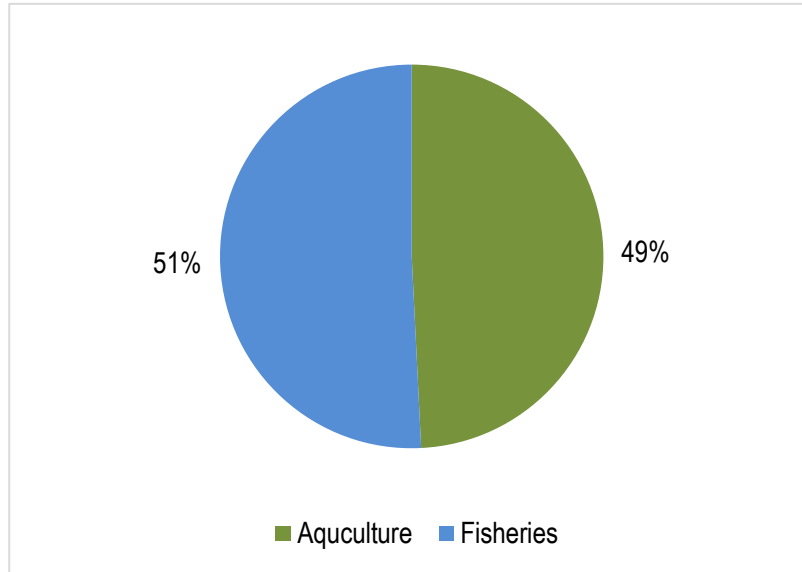
HUNGARIAN UNIVERSITY OF  
AGRICULTURE AND LIFE SCIENCES

Institute for Aquaculture and  
Environmental Safety

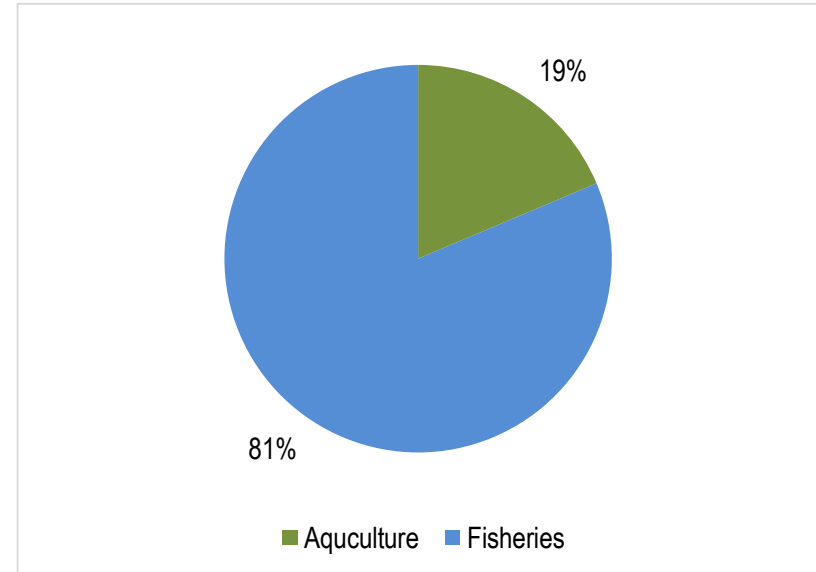
# Share of aquaculture in the aquatic animal supply in the EU and on global level



## Aquaculture production on global level



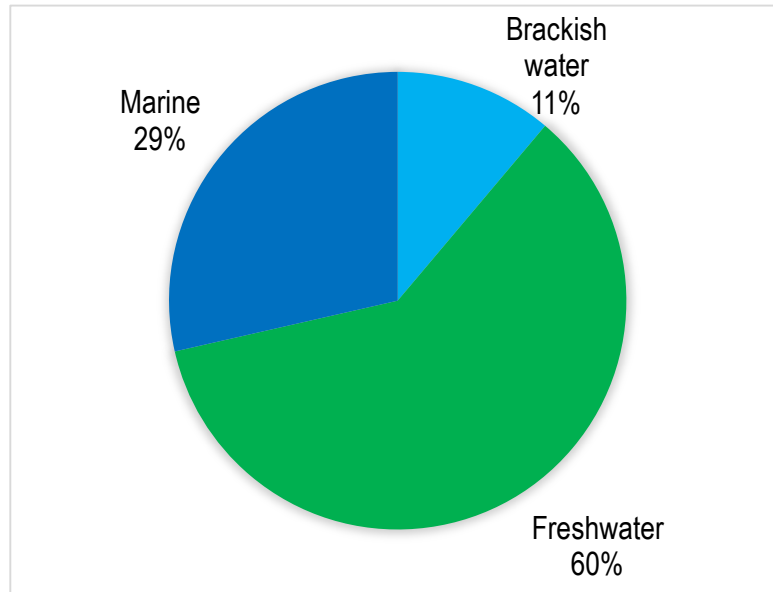
## Aquaculture production in the EU



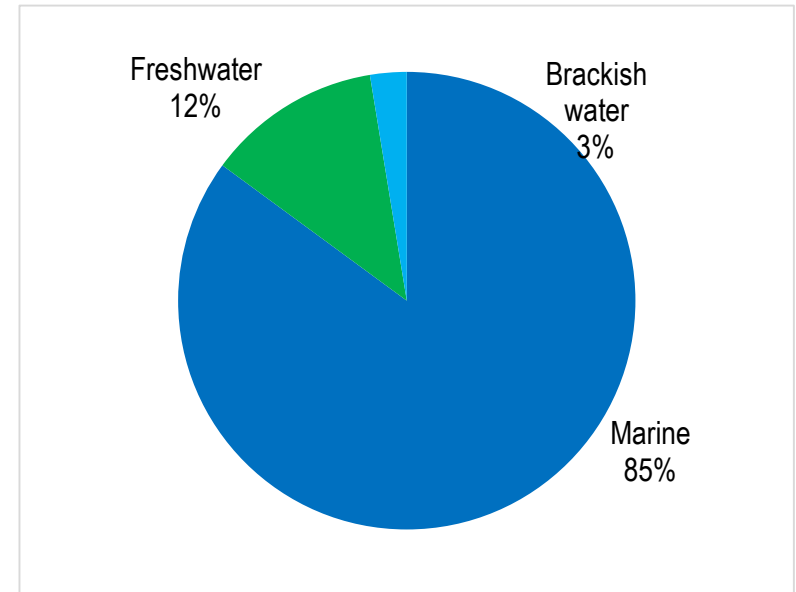
# Contribution of freshwaters to the aquaculture production



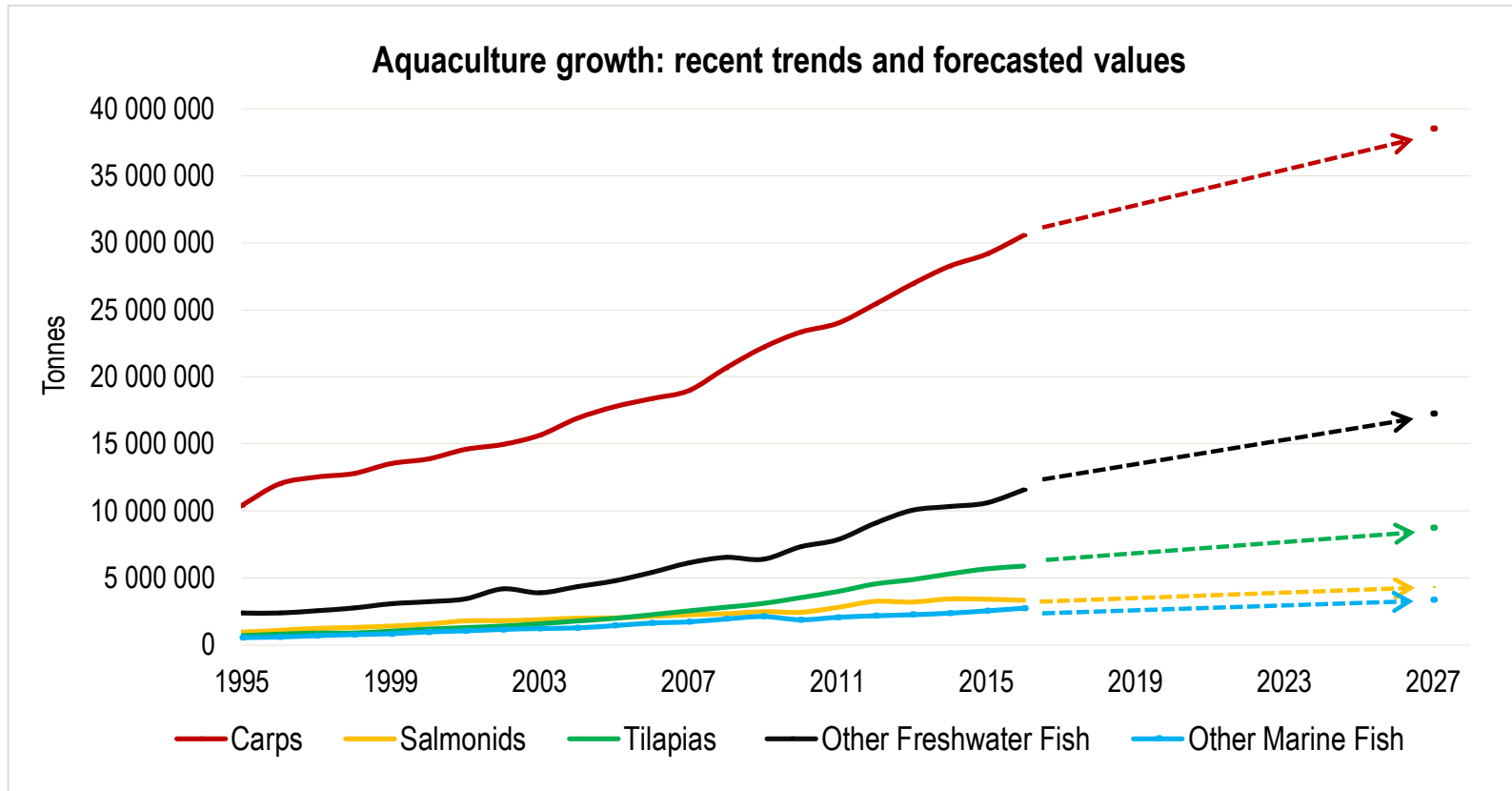
Global aquaculture production by origin



European aquaculture production by origin

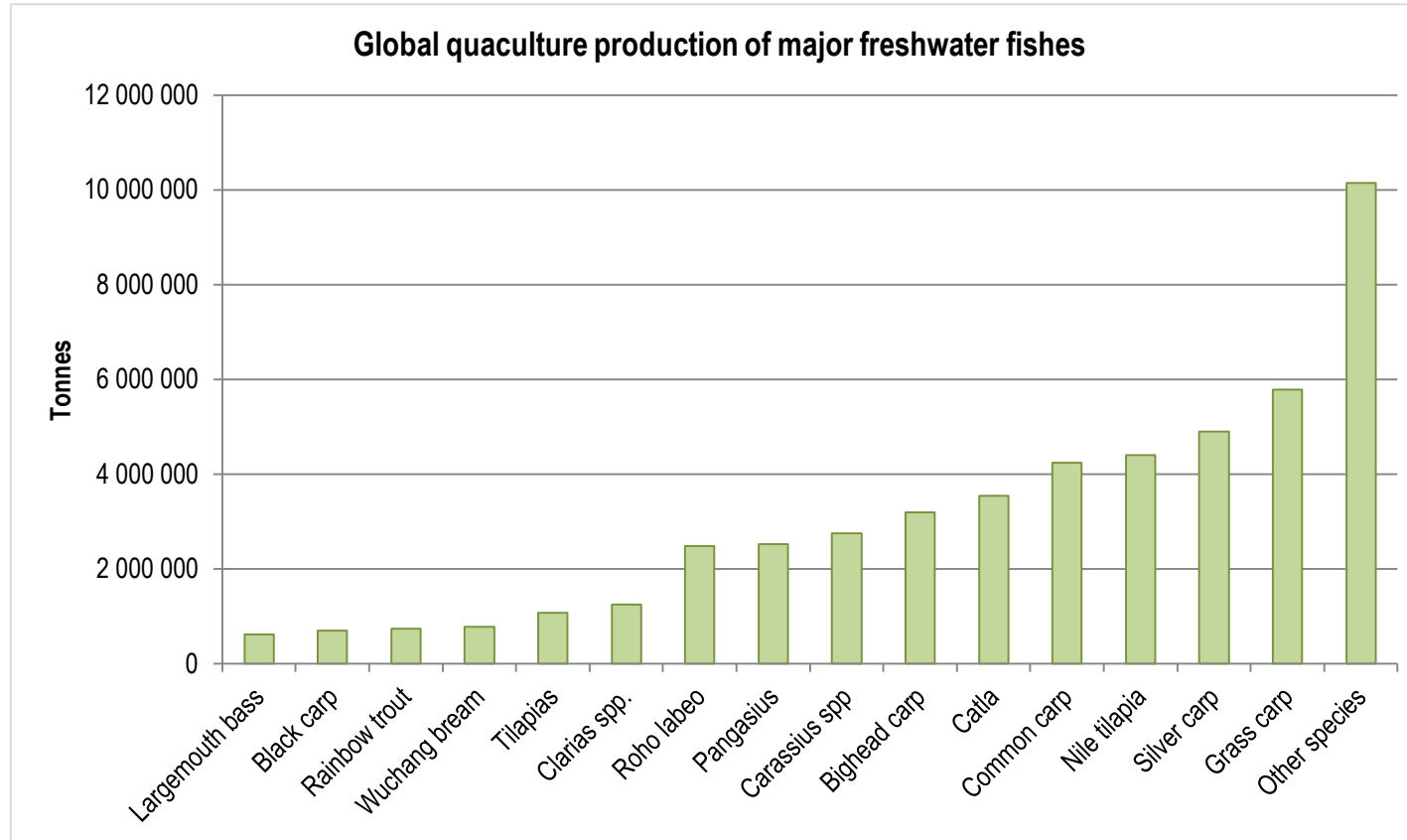


# Economic potential of low trophic freshwater aquaculture species

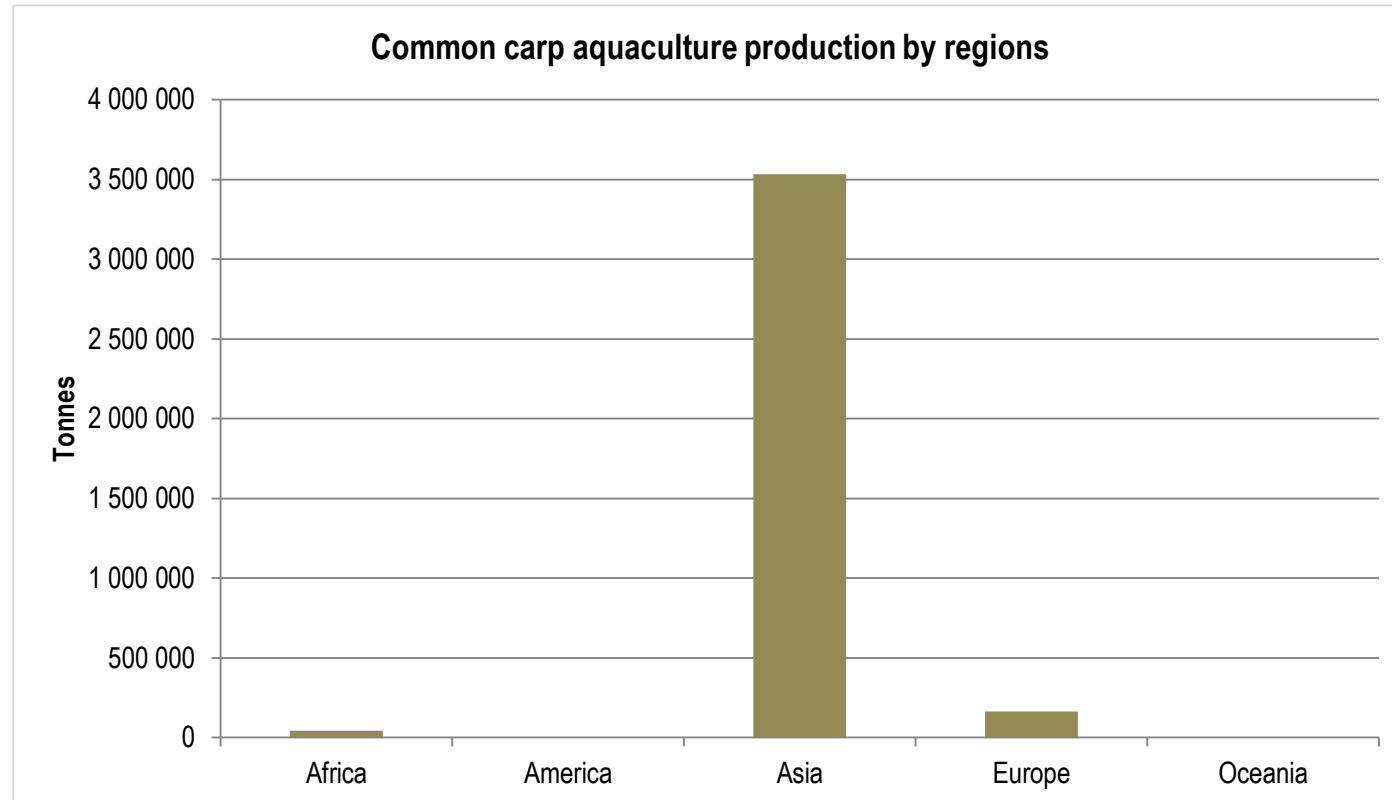


Source: FAO Fishstat 2018, OECD/FAO, 2018

# Global production of major freshwater aquaculture species

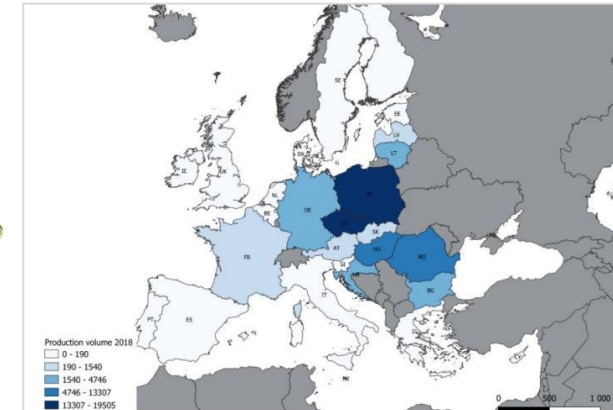
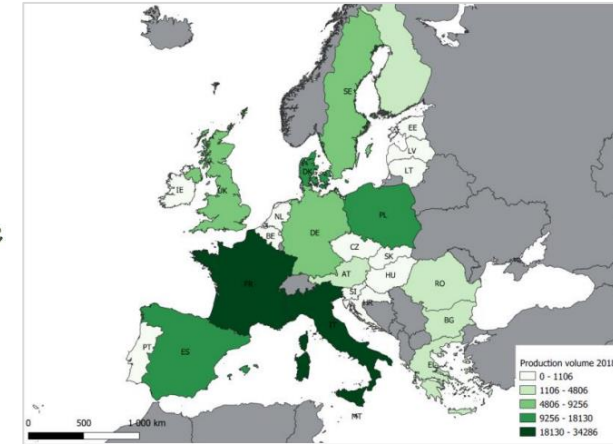


# Regional distribution of Common carp aquaculture production

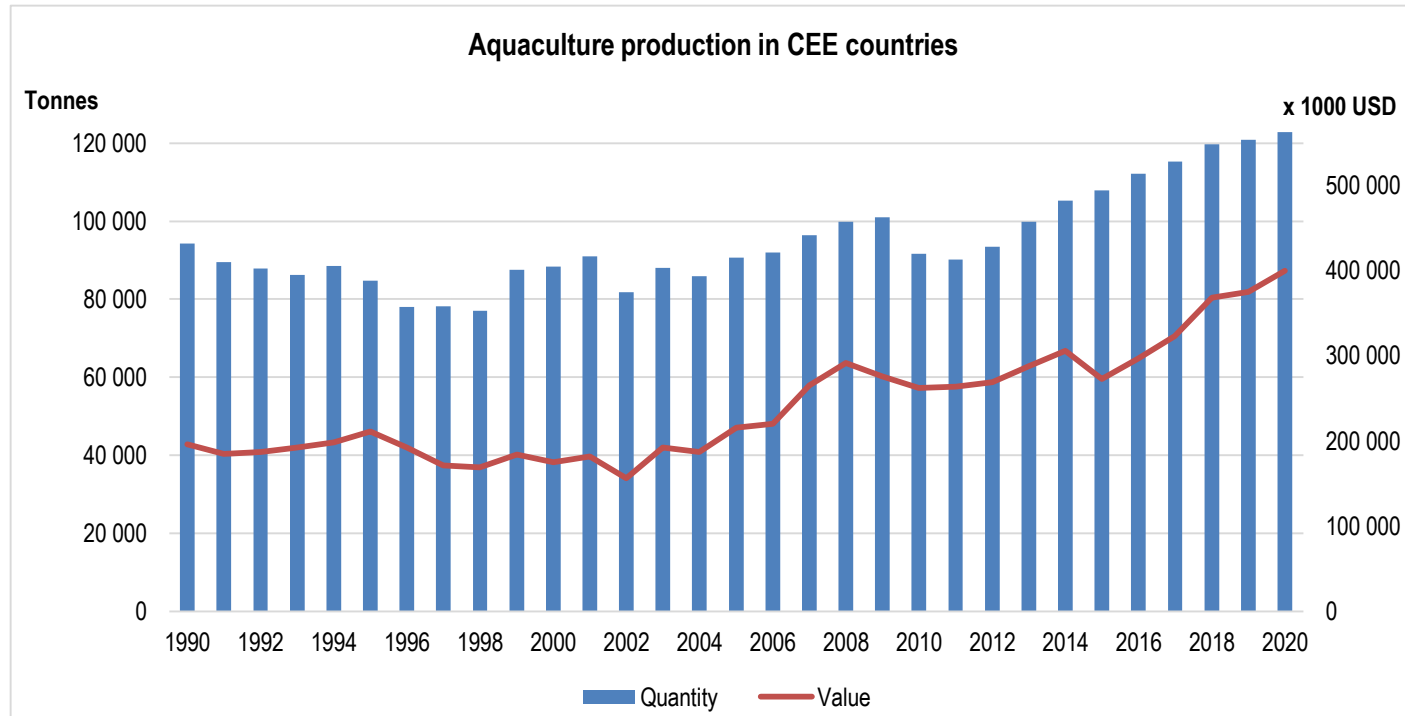


# Regional differences in freshwater aquaculture production by species

- EU total aquaculture production: 1.1 Mt
- EU freshwater aquaculture production: 0.275 Mt
- EU consumption of aquaculture production: 11.4 Mt
- Consumption covered by local production (total): 9.6%
- Import from third countries: 90.4%



# Economic potential of freshwater aquaculture in the CEE regions: increasing production



Source: Eurostat 2021



# Farm systems in Common carp production



Pond system

**Extensive/Semi-intensive**



**Intensive < 10%**



In-Pond Raceway



Intensive earthen pond



Tank system



Cage system



*Values of carp aquaculture*

**MATE**

HUNGARIAN UNIVERSITY OF  
AGRICULTURE AND LIFE SCIENCES

Institute for Aquaculture and  
Environmental Safety

# Socio-economic values of carp aquaculture in the EU



- 80,000 tonnes of carp production that is 26% of the total EU freshwater aquaculture production.
- 260,000,000 Euro production value.
- Domination of extensive pond aquaculture, with complex environmental benefits.
- Low food chain species, production independent from marine fisheries based fish meal.
- Short food supply chain.
- High economic resilience due to extensive and seasonal production method.
- 13,000 employees in rural areas.



# Environmental values of pond aquaculture



- **Pond aquaculture maintains 250.000 ha man-made wetlands in the EU.**
- **Pond fish farms contribute to preserve biodiversity:**
  - More than 400 bird species, most of them with NATURA 2000 importance
  - Substantial part of the otter population in Europe
  - Numerous wetland related plant and animal species with European significance
- **Pond fish farms contribute to better water management**
  - Retention of water, CO<sub>2</sub>
  - Retention of soluble and floating compartments of supply water

1 HA POND RETAINS YEARLY:  
3.8 – 8.4 kg Phosphorous  
96 – 560 kg Nitrogen  
1100 – 1600 kg Suspended Solids

(Knösche et al. 2000)



## Regulating and maintaining services of fish ponds:

- CO<sub>2</sub> absorption/Global climate regulation
- Microclimate regulation
- Air quality regulation
- Water quality regulation
- Water storage
- Excess water retention
- Groundwater recharge

## Provisioning and cultural services of fish ponds:

- Reed production
- Livestock and crop production near the ponds (e.g. utilization of dams and other open areas)
- Recreational opportunities/Ecotourism
- Aesthetics
- Environmental education
- Cultural heritage/Source of inspiration
- Opportunity for research

(Palásti et al. 2021)





*Threats*

**MATE**

HUNGARIAN UNIVERSITY OF  
AGRICULTURE AND LIFE SCIENCES

Institute for Aquaculture and  
Environmental Safety

# Socio-economic challenges of pond aquaculture



- Labour intensity of pond aquaculture.
- Low productivity, seasonal and uncertain product supply in pond aquaculture.
- Low processing level and weak supply chain in pond aquaculture.
- Significant land requirements of pond aquaculture.
- High investment costs.
- Low profitability.



# Environmental challenges of freshwater aquaculture



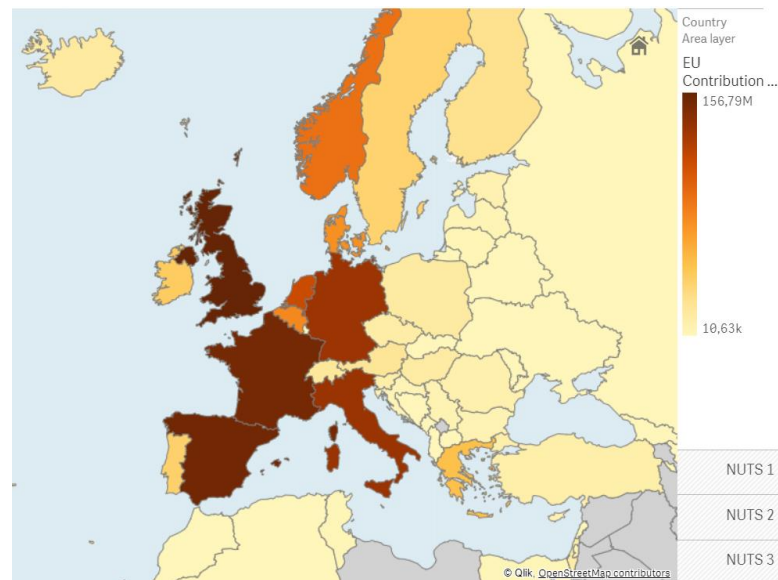
- Decreasing renewable water resources.
- Decrease of predictability of water regime.
- Water quality issue.
- Increasing water blooming.
- New pathogens.
- Decrease of non-specific immune status.
- Impact of wildlife.
- Invasive competitor species.





- No accepted support for creation and maintenance of complex natural-environmental values of constructed wetlands (fish ponds (that should be financed by the European Regional Development Fund determined as important rural development goal.)
- Lack of coordinated Great Cormorant management plan on European scale.
- Unnecesssary administrative burden, due to the over regulation.
- Undervalued EU contribution to the RDI of freshwater aquaculture development.

Participation in H2020 programs between 2014-2019 based on Blue Growth and Sustainable Food Security Projects





*Potentials of carp aquaculture*

**MATE**

HUNGARIAN UNIVERSITY OF  
AGRICULTURE AND LIFE SCIENCES

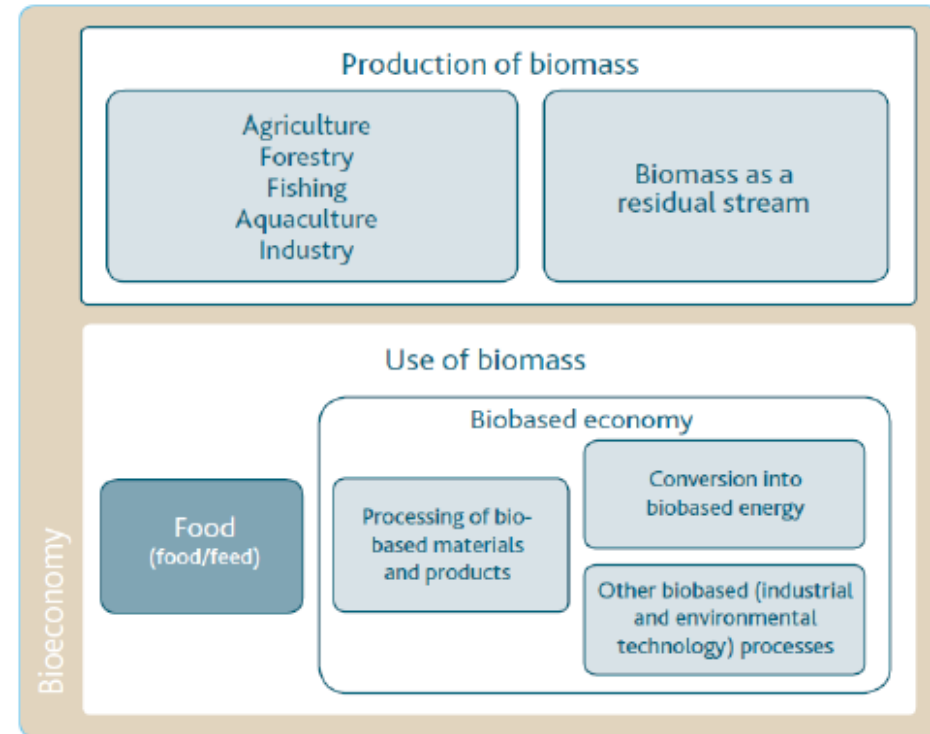
Institute for Aquaculture and  
Environmental Safety



**Focusing on research and innovations for more sustainable, competitive and resilience production systems**

## European Bioeconomy Strategy (2012)

„The bioeconomy encompasses the production of renewable biological resources and their conversion into food, feed, bio-based products and bioenergy. It includes agriculture, forestry, fisheries, food and pulp and paper production, as well as parts of chemical, biotechnological and energy industries. Its sectors have a strong innovation potential due to their use of a wide range of sciences (life sciences, agronomy, ecology, food science and social sciences), enabling and industrial technologies (biotechnology, nanotechnology, information and communication technologies (ICT), and engineering), and local and tacit knowledge.”



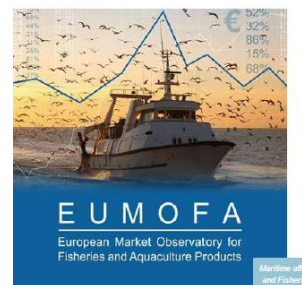
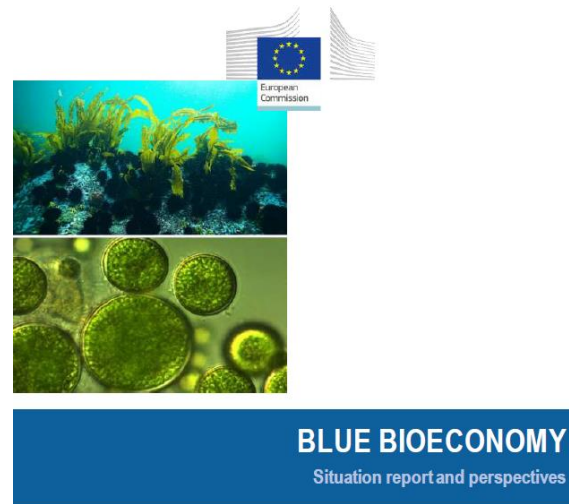
# Blue bioeconomy in the EU



„Blue bioeconomy is based on sustainable and intelligent use of biological resources from the sea, lakes, streams and aquaculture.” ([www.aqua.dtu.dk/english/research/topics/blue-bioeconomy](http://www.aqua.dtu.dk/english/research/topics/blue-bioeconomy))

By “blue bioeconomy”, it is intended any economic activity associated with the use of renewable aquatic biological resources to make products. (EUMOFA 2018)

**Freshwater-based bioeconomy is also blue!**  
**Aquaculture is also part of bioeconomy!**



LAST UPDATE: 2018

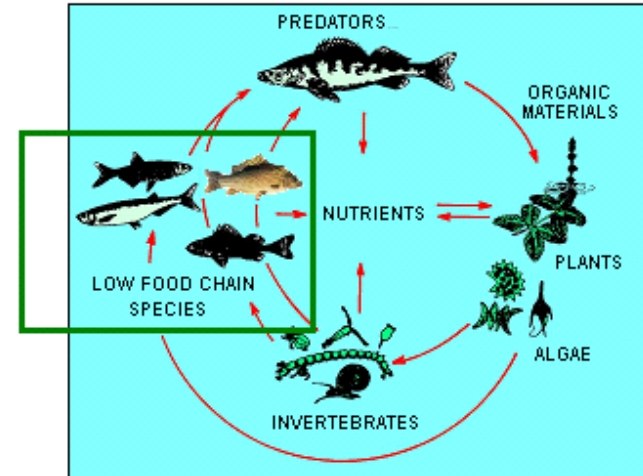
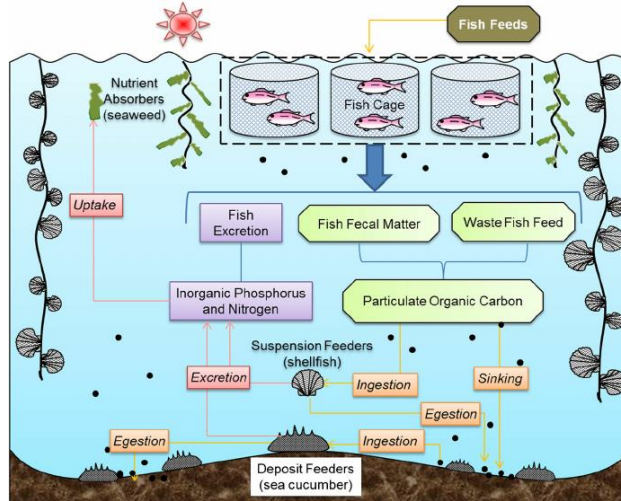
[WWW.EUMOFA.EU](http://WWW.EUMOFA.EU)

Maritime Affairs  
and Fisheries

# Directions of innovation in the context of bioeconomy

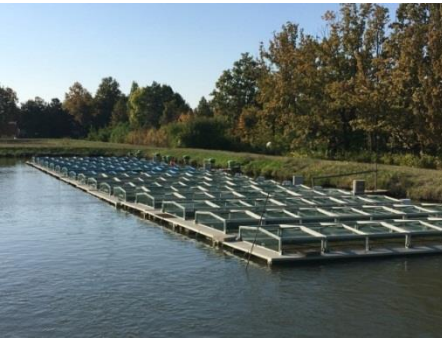


1. **Development of new systems, focusing on freshwater low trophic species as microalgae, plants, molluscs, crustaceans, herbivorous and omnivorous fish species.**
  - Development of freshwater integrated multitrophic aquaculture (IMTA) systems.
  - Development new models of existing systems RAS-pond combination.



## 2. Sustainable intensification of pond aquaculture through the introduction of different combined intensive-extensive systems.

- Combined intensive-extensive pond system;
- cage in pond system
- tank-pond system
- inpond raceway system
- RAS-pond system



## 3. Lessons learnt from traditional pond aquaculture for the development of circular biobased farming

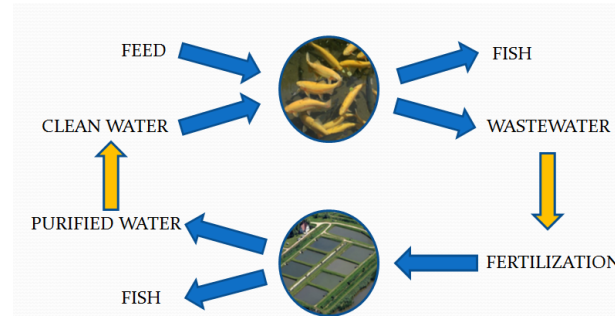
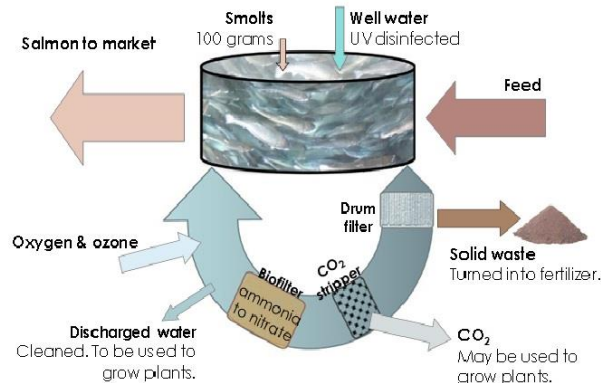
- evaluation of interactions between freshwater aquaculture and environment;
- ecosystem service studies;
- climate-resilient production methods;
- social-economic studies: diversified income in multifunctional fisfarms; enhance crisis-resilient and cost-minimising production systems.





## 4. Enhance circular approach

- in the aquaculture sector: circular solution between intensive-extensive aquaculture systems;
- among aquaculture and other sectors: use or reuse of by-products from aquaculture to other sectors, utilisation of industrial and agricultural by-products in freshwater aquaculture.



- 5. Elaboration of the framework for organic aquaculture production in ponds, development of guidelines and legislation, taking into account the F2F Strategy recommendation for a significant increase in organic aquaculture production.**
  - Adjust the rules for organic pond aquaculture, which can release the current bottlenecks, need to review of organic pond aquaculture in the framework of EU legislation on organic production (2018/848 EU Regulation).
  - The legislation should reflect the fact that production in these artificial systems creating fishpond ecosystem, which is based on natural ecological processes, fish are being fed here to a determining part by the elements of natural food web.



## 6. Knowledge and technology transfer

- Strengthen cooperation among producers, their associations and scientists to improve the international representation of the sector in order to get the specific values of freshwater pond fish culture better acknowledged and considered essential part of development programs in Europe and worldwide.



# Conclusion



- The potential of freshwater aquaculture, especially pond farming is largely underestimated in the EU, although the pond aquaculture gives complex social-economic and environmental benefits beyond produce healthy food.
- Freshwater aquaculture can be an important component of blue bioeconomy, not only as an efficient and sustainable biomass-producing sector, but also due to its potential for waste minimization, its complex natural services and as a basis for other bio-based industries.
- Efforts are needed to improve the efficiency of these systems and increase their contribution to food supply, job creation and maintenance or improve biodiversity.

A sunset scene over a large body of water, likely a lake or bay. The sun is low on the horizon, creating a bright orange and yellow glow that reflects on the water's surface. The sky is filled with soft, wispy clouds in shades of orange, yellow, and grey. In the foreground, the dark silhouettes of reeds or tall grasses are visible, partially obscuring the bottom of the frame. The overall mood is peaceful and serene.

**Thank you for your attention!**

**Halasi-Kovacs.Bela@uni-mate.hu**