Values and opportunities of pond aquaculture in Europe

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5th International Carp Conference
Onoldia Hall, Ansbach, 4-6 of September 2019

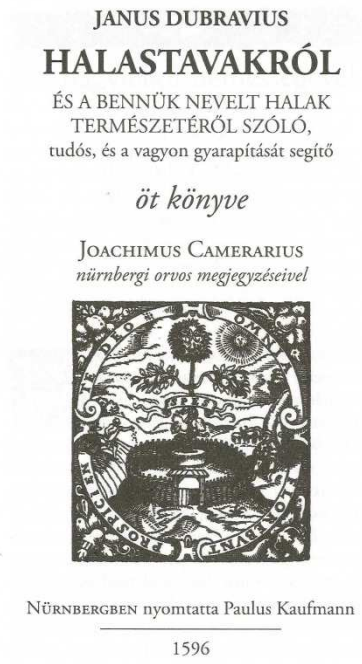
NAIK
Nemzeti Agrárkutatási és Innovációs Központ

Pond aquaculture is the cultural heritage of Europe

- Written and painted relics from the medieval Europe

„Thursday" painted by Walter Dendy Sadler (1854–1923)

„The Four Elements:Water" painted by Joachim Beuckelaer (1535-1575)



Janus Dubravius (1547): De piscinis et piscium, qui in illis aluntur, naturis, libri quinque, út doctissimi, ita ad rem familiarem, augendam utilissimi

Military map from the 18th century with fish ponds in Transylvania

„Still life with fish and cat" painted by Clara Peeters (1594–after 1657)

Overview of the EU aquaculture

Total European aquaculture production: 1 292 597 t

Marine: 77.8%
(1 006 035 t)

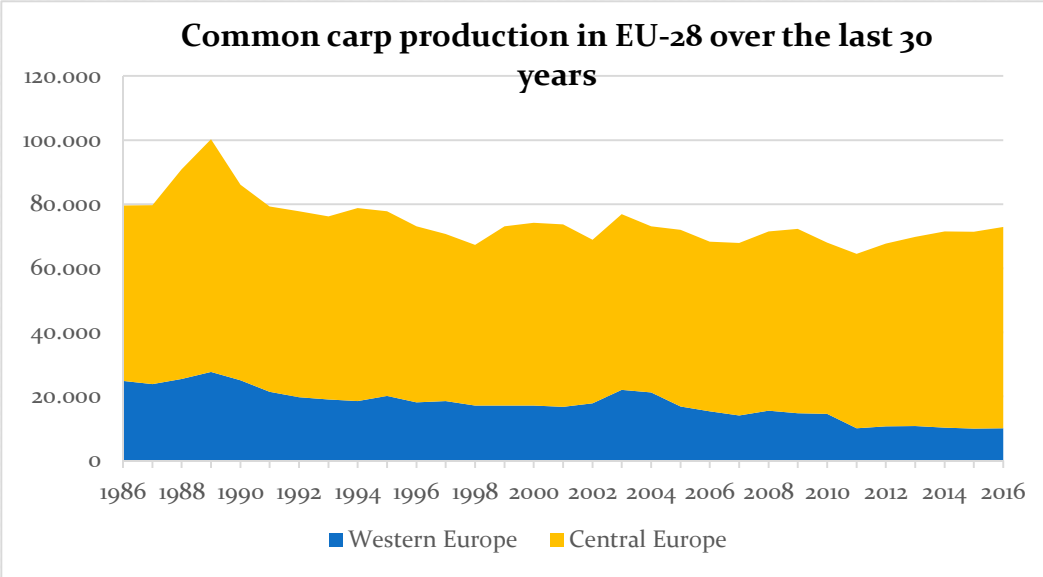
Freshwater:
22.2% (286 563 t)

Aquaculture = 100%

Other sp.
56 887 t
19.9 %

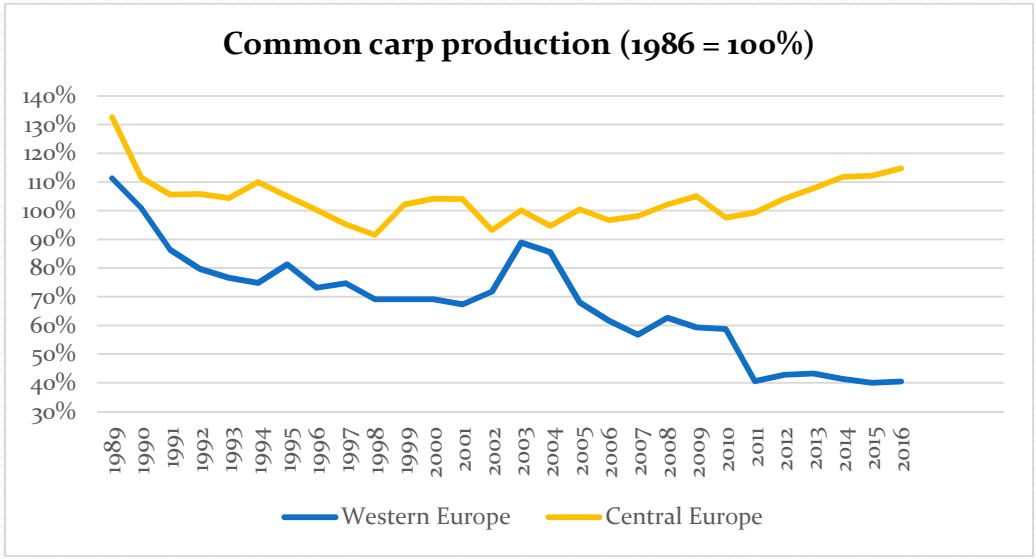
Source: FAO Fishstat Plus, 2016

Trends in carp production



Common carp production in the EU:

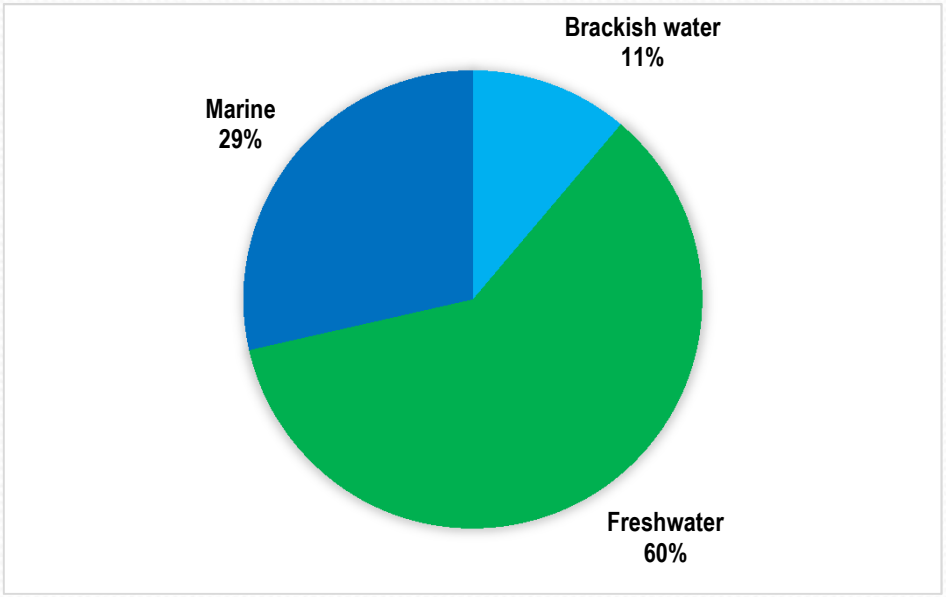
- Significance part of production in Central Europe
- Production of Western European countries has been steadily decreasing
- Production in Central and Eastern Europe is slightly increasing



Source: FAO Fishstat, 2018

Contribution of freshwater aquaculture to the total production

Global aquaculture production by origin



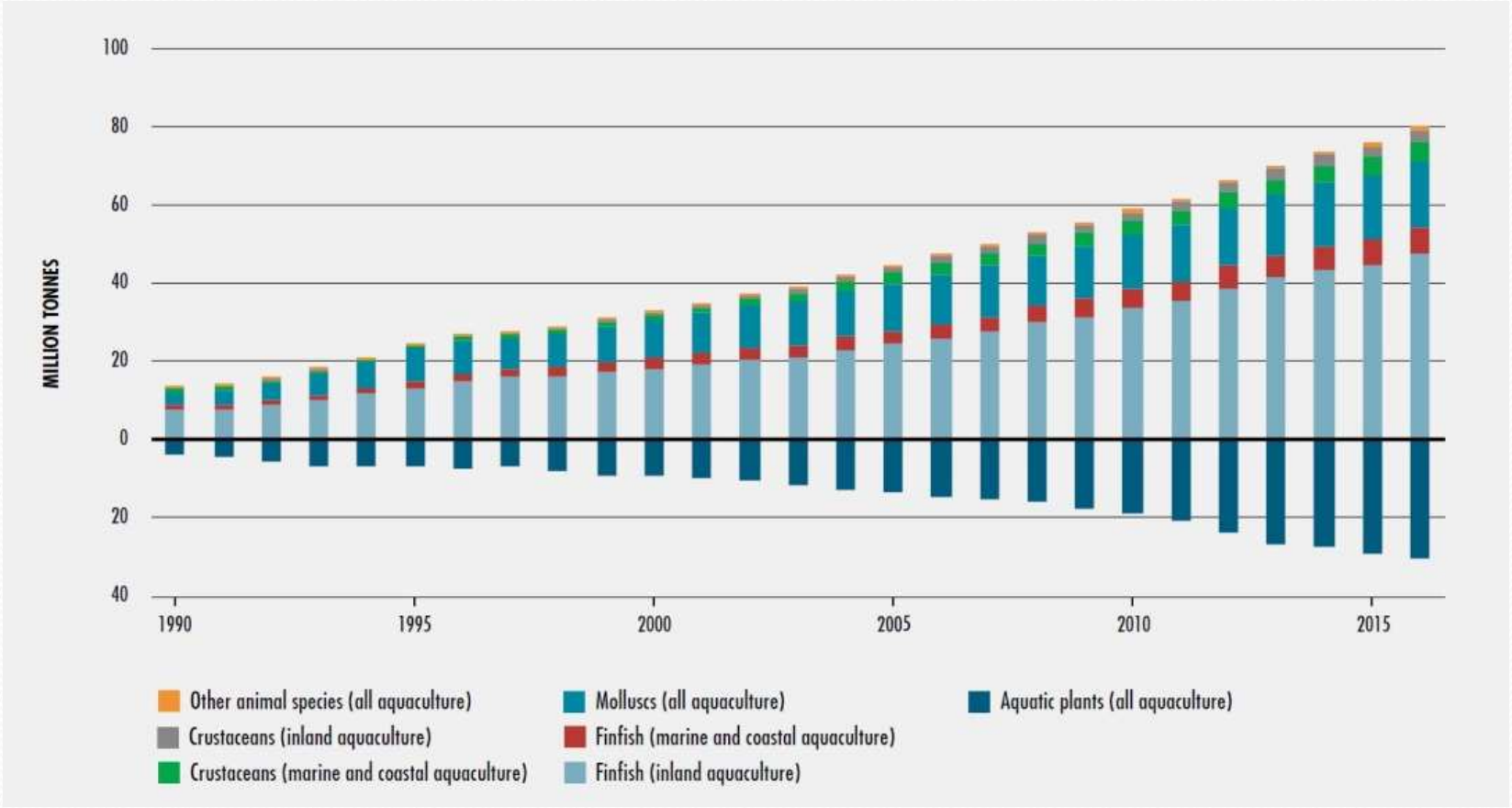
Source: FAO Fishstat 2018

International landscape of fisheries and aquaculture

Position	Fisheries (Mt)	Aquaculture (Mt)
#1	China 17.6	China 47.6
#2	Indonesia 6.5	India 5.2
#3	USA 5.0	Indonesia 4.3
#4	India 4.8	Vietnam 3.4
#5	Peru 4.8	Bangladesh 2.1
#6	Russia 4.6	Norway 1.4
#7	Japan 3.5	Egypt 1.2
#8	Chile 3.0	Myanmar 1.0
#9	Vietnam 2.8	Chile 1.0
#10	Norway 2.3	Thailand 0.9

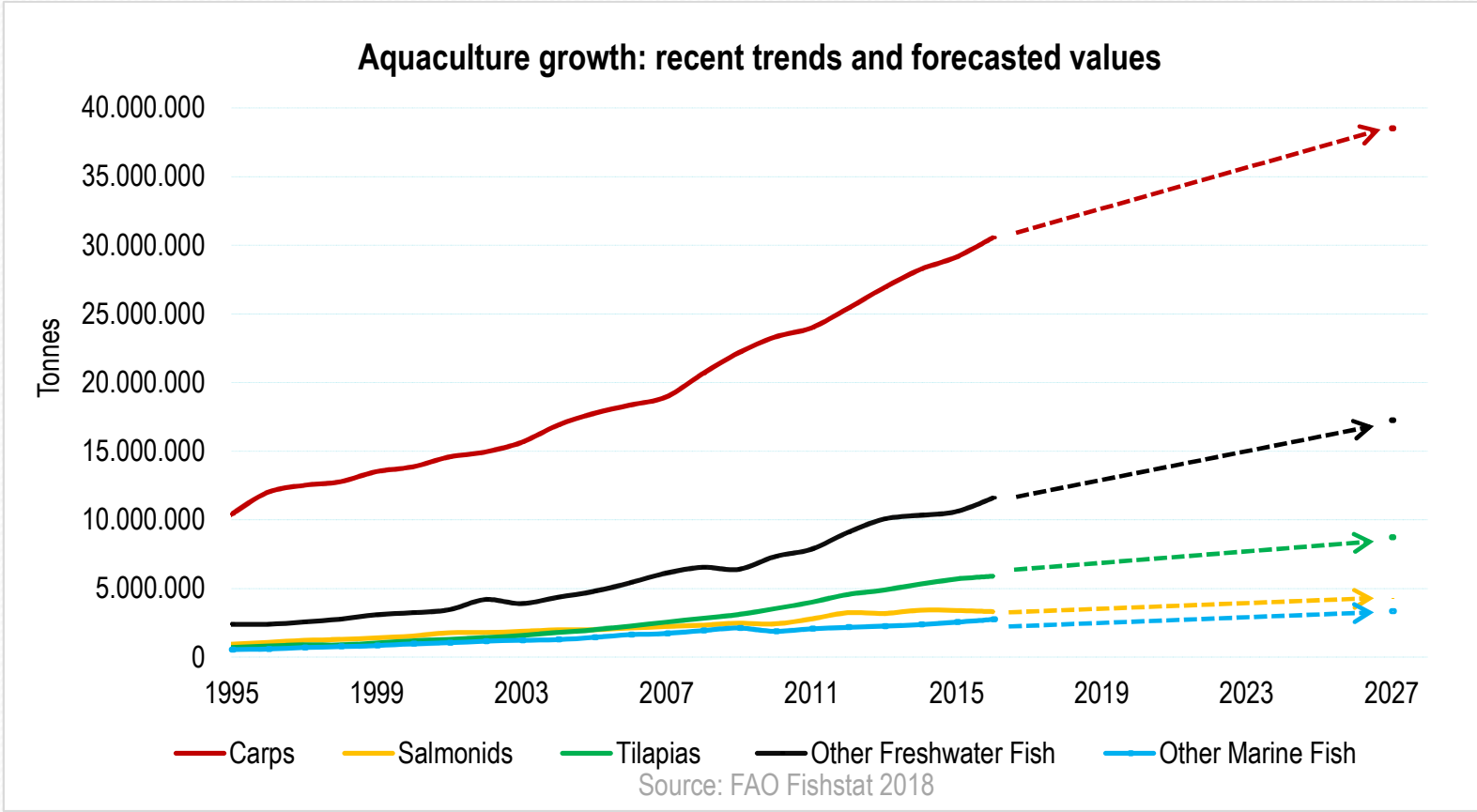
Source: EUMOFA 2018

Contribution of freshwater finfish aquaculture to the total production



Source: FAO 2018

Relevance of carps production in the world aquaculture



Source: FAO Fishstat 2018, OECD/FAO, 2018

Ecological aspects of pond aquaculture

- Based on common carp production.
- Polyculture production (common carp, silver carp, grass carp, european catfish, pike, pikeperch).
- Based on the material flow processes typical of natural wetlands, artificial interventions only contribute these processes to increase production.
- Fishponds operate as an open ecological system where natural and technological processes are built on one another and are implemented in a non-separable way.
- Create a special fispond ecosystem.

(Halasi-Kovács 2012)

The pond ecosystem

Natural wetland

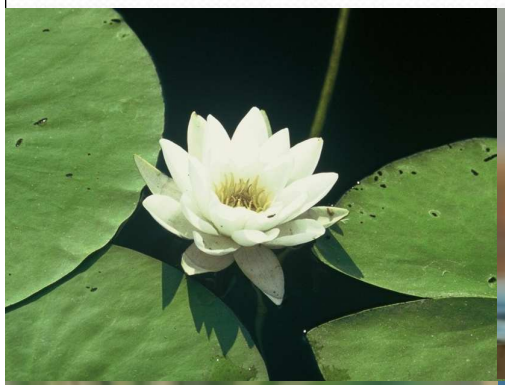
Fish pond

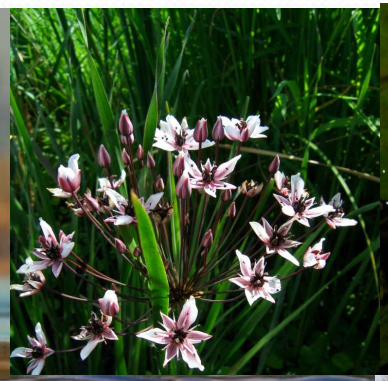
- Fishponds has artificial origin. The water supply is also artificial (by gravity, or by pump) in decisive part.
- Comparable nutrient cycling processes.
- Artificially high nutrient level that is removed by the harvested fish.
- It results steady state, and high biomass in every level of food chain all over the vegetation period.
- Planktonic predominance that maintained by the carp stock.
- Typical mosaic-complex that develops by the results of periodic water filling and drainage.

(Halasi-Kovács 2012)

Additional natural values of pond aquacuture

- Pond aquaculture maintains 250.000 ha natural-like 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








Additional environmental values of pond aquacuture

- Pond fish farms contribute to better water management.
  - Retention of water
  - Retention of dissolved and solid components in supply water

1 ha pond retains in one year :

3.8 – 8.4 kg	**Phosporous**
96 – 560 kg	**Nitrogen**
1100 – 1600 kg	**Suspended Solids**

(Knösche et al. 2000)

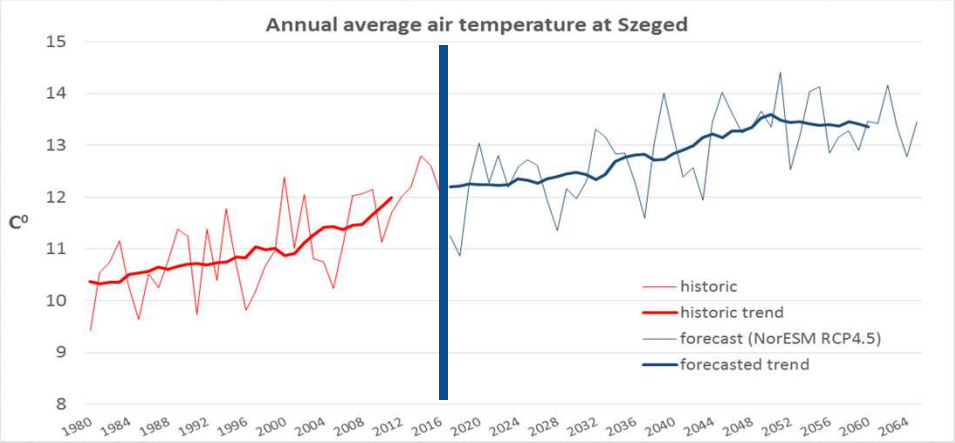
Pond fish farms contributes to achieve the EU environmental policies

NATURA 2000 is the centrepiece of EU nature & biodiversity policy. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats. It is an EUwide network of nature protection areas established under the 1992 Habitats Directive.	NON PRODUCTION FUNCTION OF FISH PONDS: • Providing important habitats for flora and fauna; • Maintanence of Biodiversity;
The WATER FRAMEWORK DIRECTIVE establishes a legal framework to protect and restore clean water across Europe and ensure its long-term sustainable use. Its official title is Directive 2000/60/EC of the European Parliament and the Council.	• Improve water management; • Receive flood waters and sustain water in the landscape.

WATER FRAMEWORK DIRECTIVE

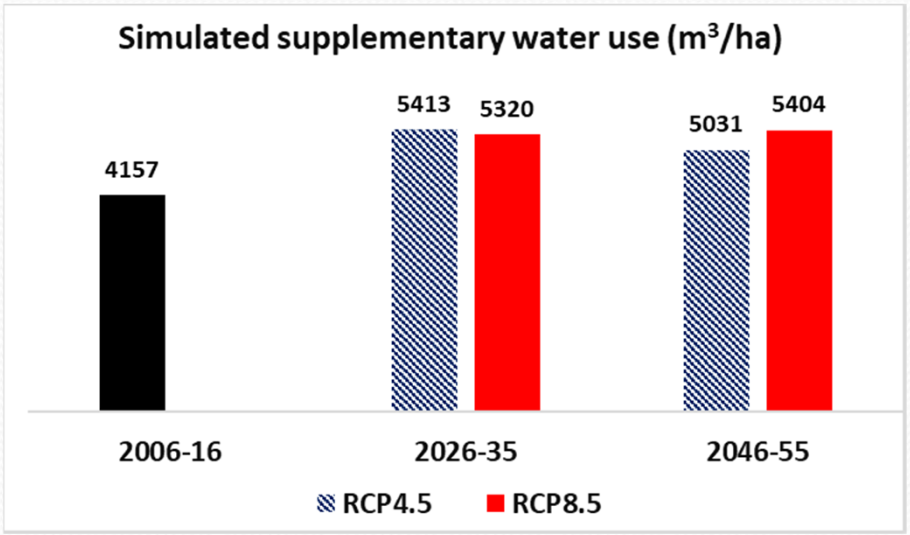



Environmental challenges of pond aquaculture



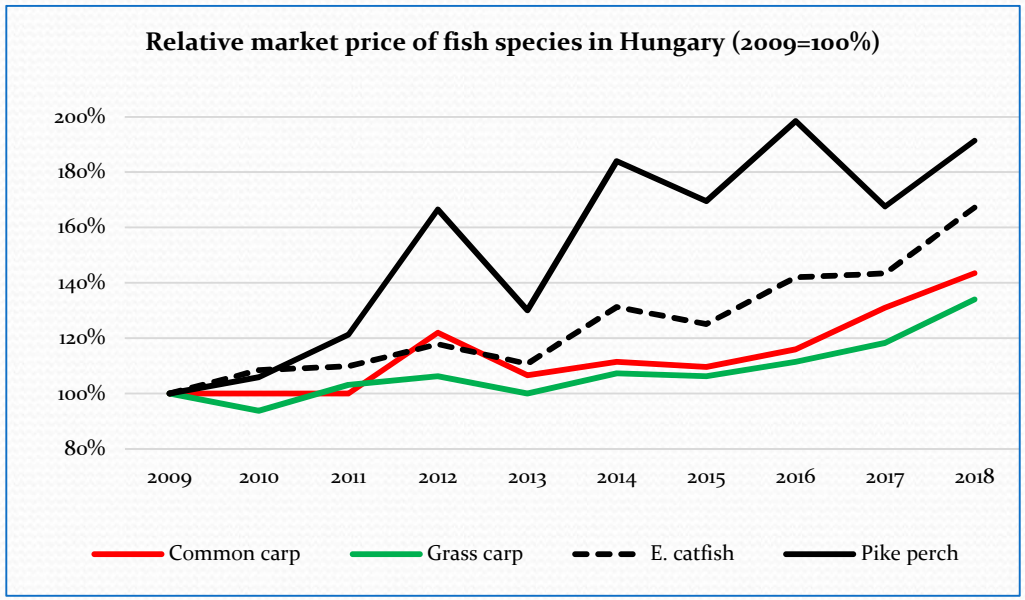
- Decreasing amount of renewable water resources
- Extremities in flow regime (low and high level)

- KHV
- New pathogens
- Decrease of non-specific immune status
- Increasing water blooming
- Invasive competitor species
- Increased nutrient concentration in water supply
- Infrastructure is exposed to more frequent flooding at barriage ponds
- Water scarcity

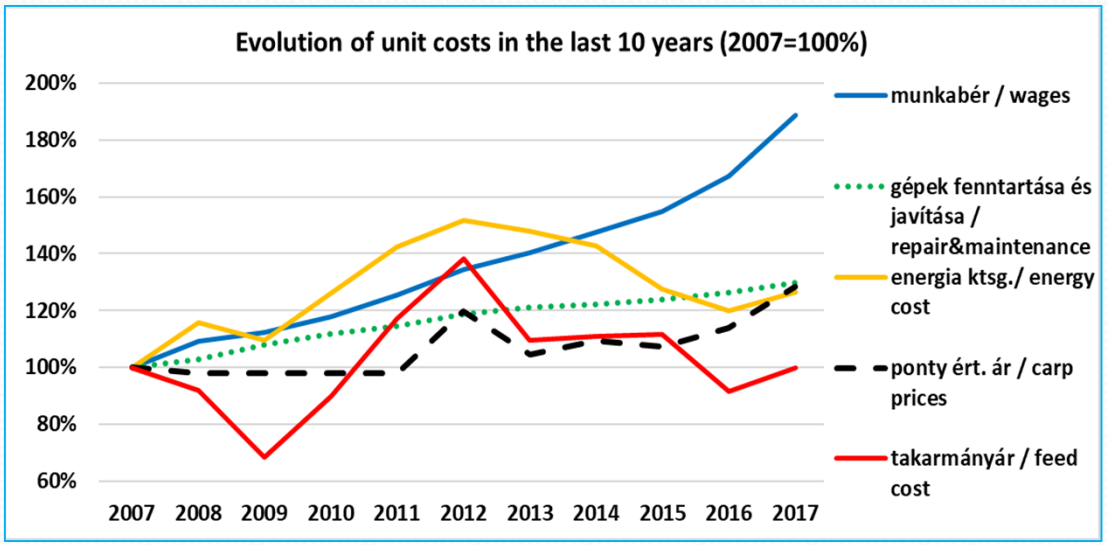


ClimeFish

Economic challenges for pond aquaculture



- High investment costs
- Low productivity
- Labour scarcity and incerasing salaries
- Additional costs of complying with environmental regulations
- Market issues: uncertain quality, stagnating demand for carp, lack of value added products

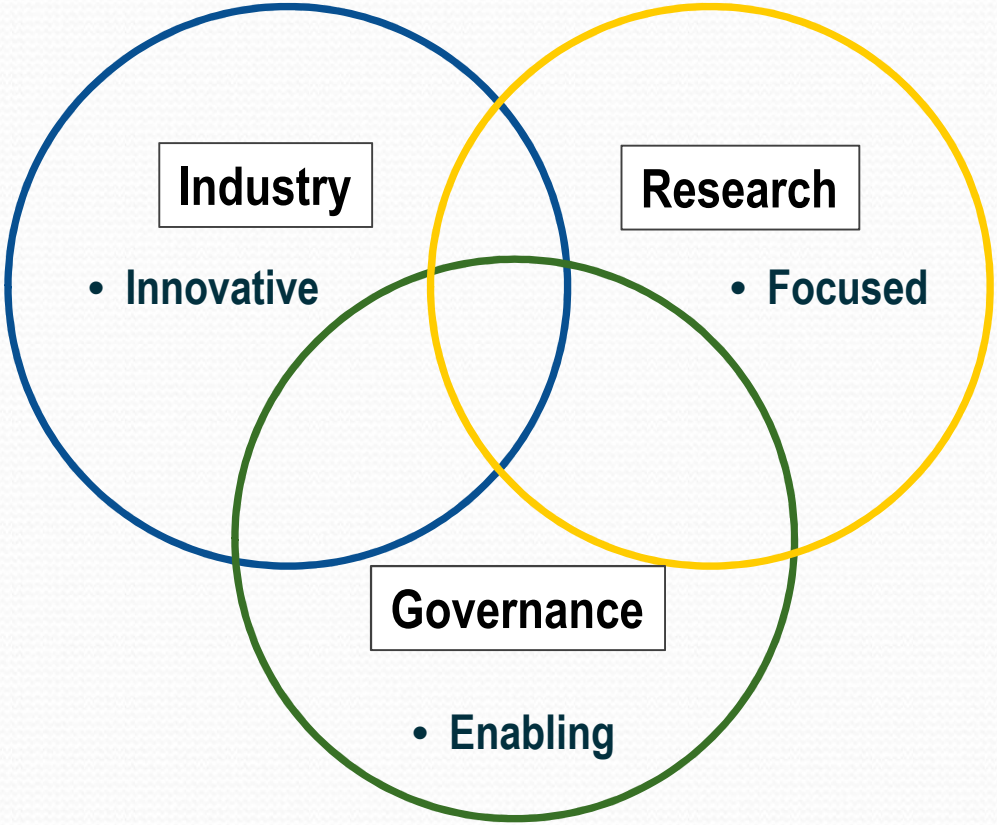


Produce for market

or

Operate an outdoor museum?

How can we boost the pond aquaculture in the EU



Tools for boost the pond aquaculture in the EU

Innovations

Knowledge and technology transfer

Subsidize the additional costs of natural value maintenance

Sustainable intensification

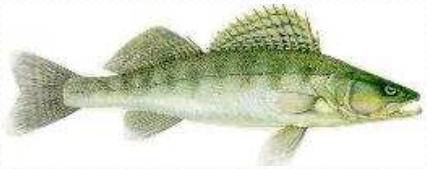
Support the maintenance of environmental values: „blue pond" subsidy

- Pond aquaculture technology can be summarized as a complex value, important for nature conservation, water management and socio-economic aspects as well.
- Providing EMFF subsidy for this technology highly recommended for the sustainability of wetlands and their associated values resulting from the fish pond management.
- The subsidy can be interpreted as supporting wetlands, rewarding „blue pond" technologies and best management practices.
- Subsidy is suggested to be 300 EUR/ha/year for 5 years (Szűcs et al. 2013).




Sustainable intensification of pond aquaculture

- **Intensive carp production in small size ponds**
  - Monoculture
  - Biculture



Sustainable intensification of pond aquaculture


Slovenia; photo by Daniel Gospic

- Combining intensive-extensive systems
  - Pond in pond system
  - Cage in pond system
  - RAS-pond system


Szarvas; photo by Halasi-Kovács


Houzhou; photo by Halasi-Ková

Sustainable intensification of pond aquaculture

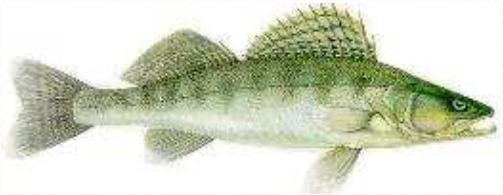
- Multi-functional pond fish farming

Higher and diversified farm income

Additional employment opportunities

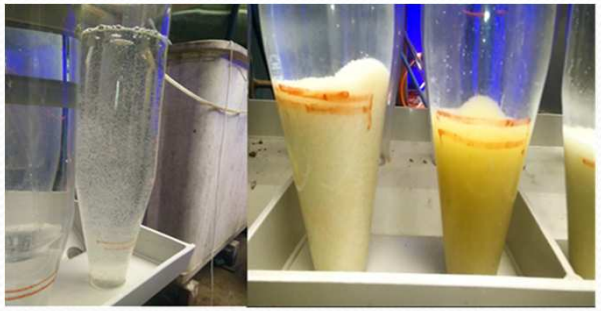
Innovation in freshwater aquaculture connected to pond farming

- **New species in intensive systems**
  - Pikeperch,
  - European catfish



- **Sustanaible feed ingredients and additives**
  - Insect protein,
  - Corn DDGS,
  - Microalgae

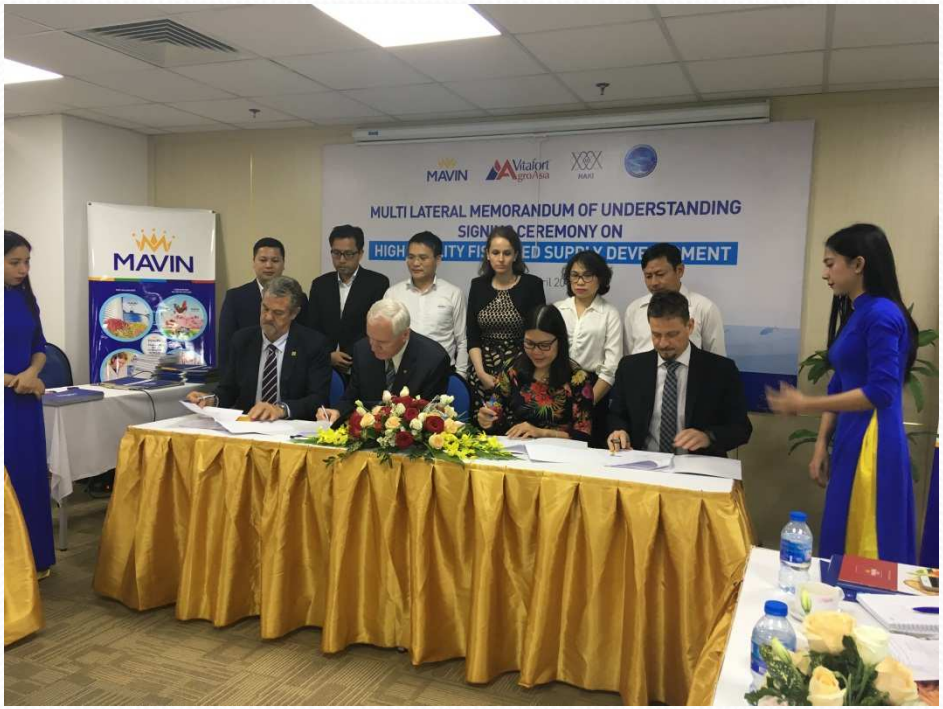
- **Focusing on additional research**
  - Social acceptance
  - Processing and marketing (product diversification, by-products utilization)
  - Standardization, labeling



Example of knowledge transfer: EURASTIP projekt

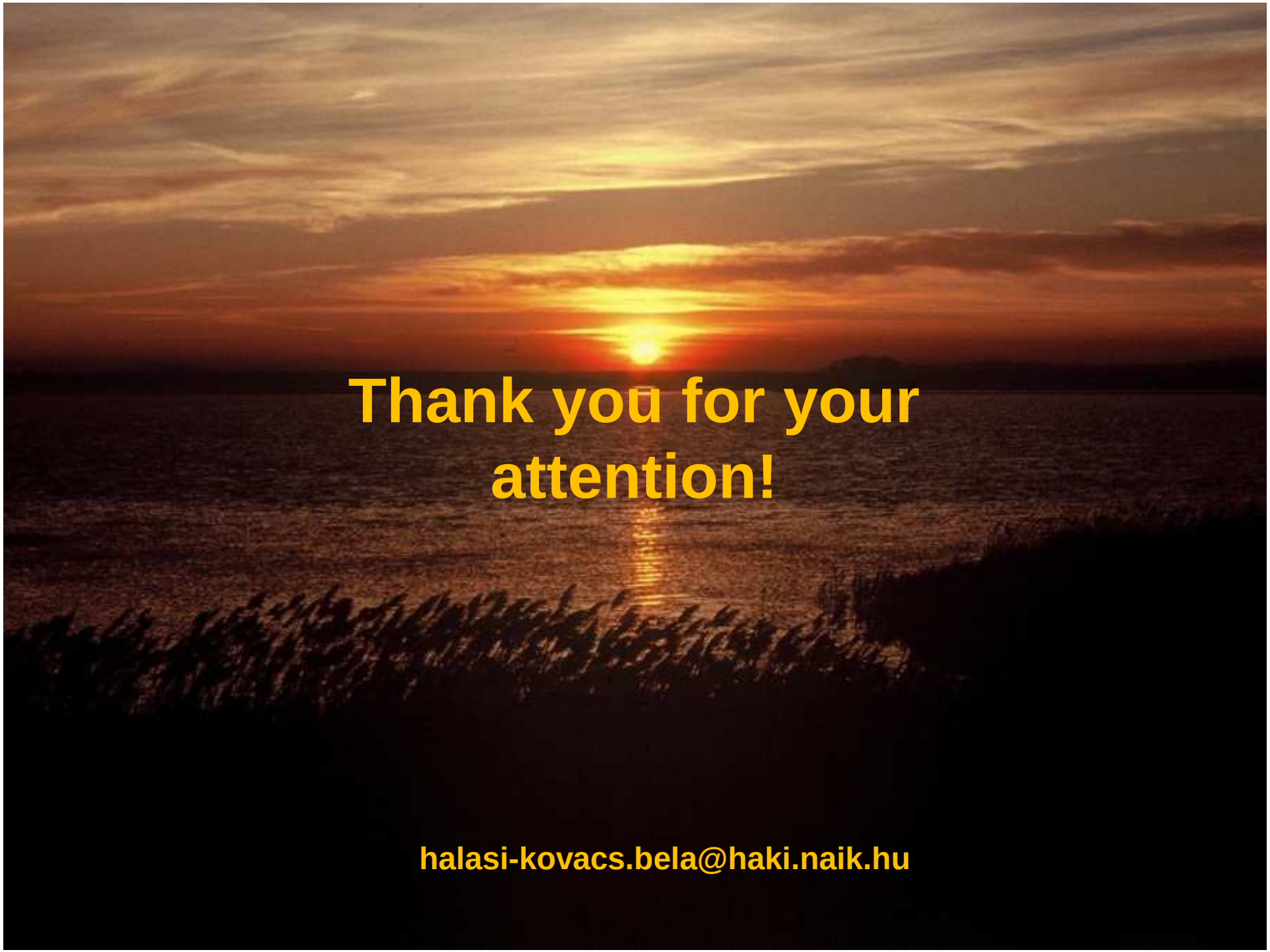
Aim: knowledge and technology transfer to Vietnam, develop a fish breeding center with regional importance

- Scientific exchange: HAKI (Hungary) - RIA1 (Vietnam)
- Industry exchange: Vitafort Agro Asia (Hungary) -Mavin Group (Vietnam)



Main conclusions

- Pond aquaculture has decisive importance in global aquaculture that ensure potential for European ones too.
- Pond aquaculture maintaines complex environmental values, so it is an excellent example for circular economy.
- Pond aquaculture should be supported for maintainance of these environmental values .
- The harmony of the three main elements – industry, research, governance – of freshwater aquaculture sector must be ensured in order to increase productivity.
- Pond aquaculture requires sustainable intensification and innovation, but the additional research activities has eminent role to fulfill these demands.
- The European pond aquaculture has great potential also in knowledge and technology transfer.


Thank you for your attention!
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