

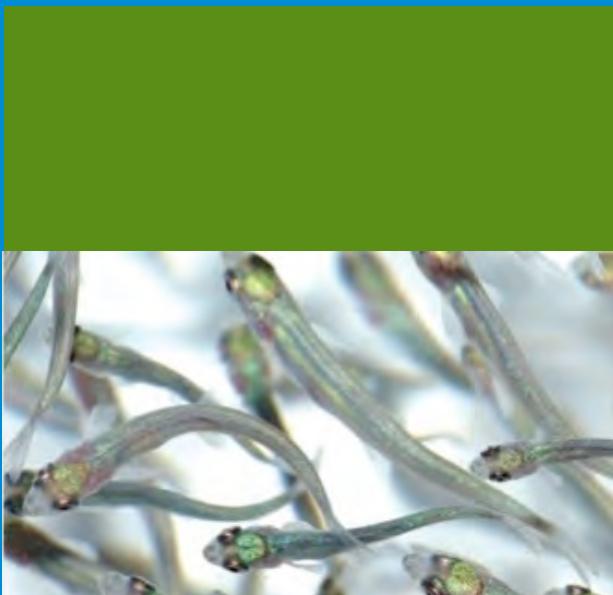
Innovations and challenges in freshwater aquaculture for the sustainable utilization and preservation of valuable freshwater resources

Prof. Dr. Reinhold Hanel



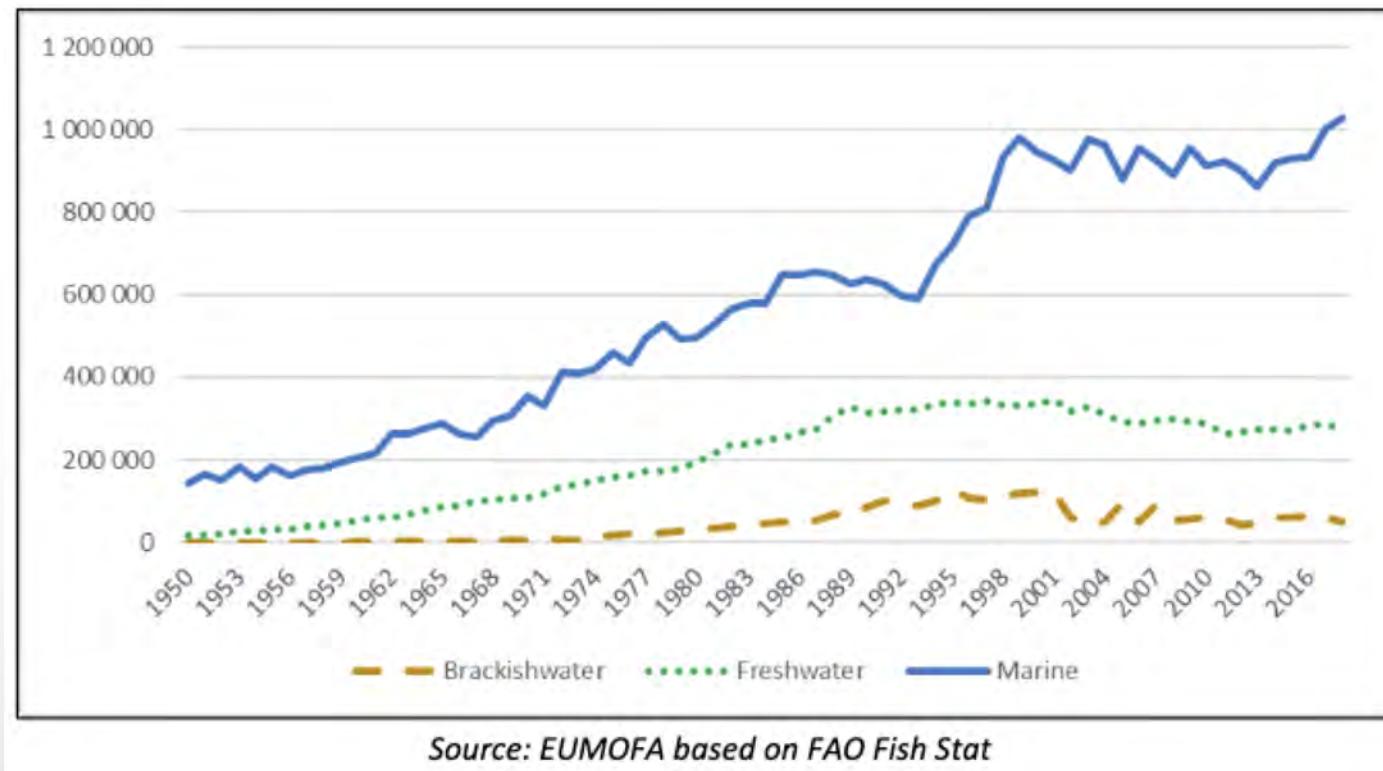
Food and Agriculture
Organization of the
United Nations

EUROPEAN INLAND
FISHERIES AND
AQUACULTURE ADVISORY
COMMISSION



Overview of aquaculture in Europe

European, Caucasus and Central Asian countries with abundant but underutilized resources for freshwater aquaculture development - stagnation or decline in production



European Region (Regional Priorities) – FAO GSA 2021

EUROPE

- **Governance and planning** - including administrative simplification, spatial planning, access rights to land and water and monitoring
- **Environmental interactions** - including water management and protection, climate change, ecosystem services and biodiversity, ecosystem based-approach
- **Biosecurity and animal welfare**
- **Capacity building and skills development** - including bringing innovation to farmers and across the value chain, and education at all levels
- **Social perception and acceptability** - including stakeholder involvement, local development and transparency

NORTH AMERICA

- **Ecosystem approach, Biosecurity, Spatial Planning & Zoning, Technology for climate change impact mitigation and adaptation, Governance**
- **Alternative feed**
- **Biosecurity & Aquatic animal health**
- **Innovation and Technology**

Eastern Europe (Regional Priorities) – FAO GSA 2021

- **Technical Innovation**
- **Environmentally Sustainable Production**
- **Governance**
- **Economic and social sustainability**
- **Disease control, animal health and animal welfare**

Technical Innovation - Intensification

- Further development of full or partial Recirculation Aquaculture Systems (RAS)
 - Indoor recirculation systems (catfish, sturgeon, pikeperch)
 - Aquaponics (Tomato fish)
 - Partial recirculation systems for Salmonids



Technical Innovation - Intensification

- Sustainable intensification of traditional pond AC systems



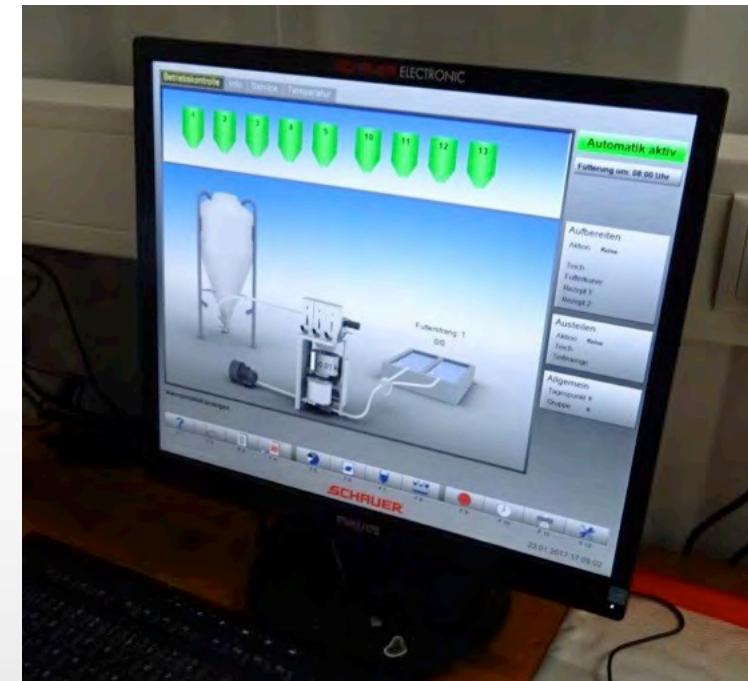
Technical Innovation - Digitalization

- Digitalization and automation to optimize resource efficiency and reduce environmental impacts (including marketing platforms)

Observation at regular oxygen conditions
(© Erick Cantu)



Observation at oxygen deficit
(© Erick Cantu)



Technical Innovation - Diversification

- New, sustainable and selective breeding, rearing and production methods (including new species and strains)



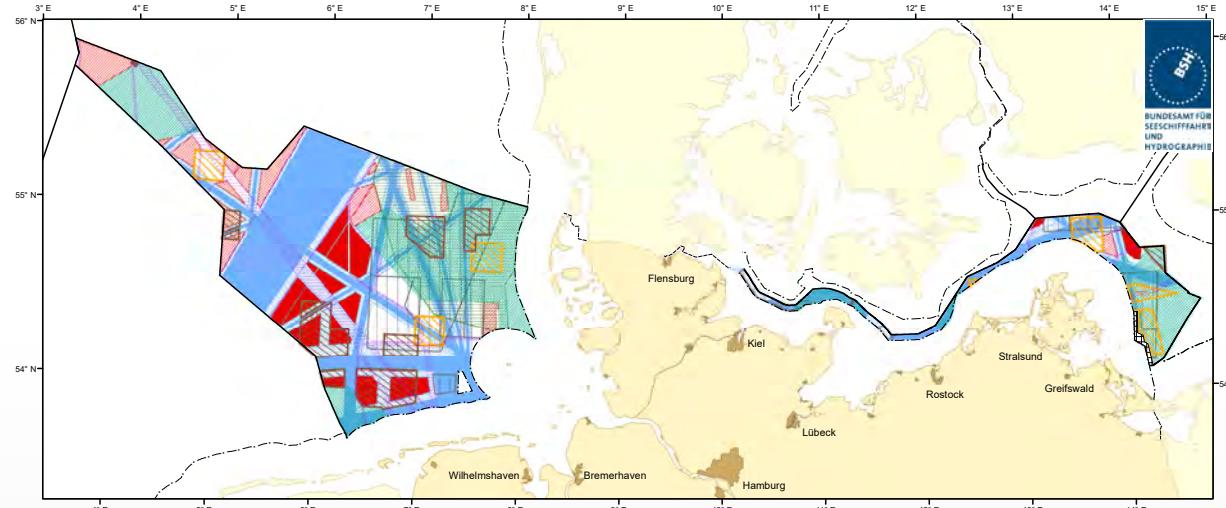
Technical Innovation - Diversification

- Adaptation to market requirements: development of new products (value adding), labelling, certification schemes, marketing strategies



Governance and Management – Access Rights

- Water resources management, including land water interactions and spatial planning



Konzeption Raumordnungsplan - Planungsmöglichkeit A: Traditionelle Nutzung

Schifffahrt

- Vorranggebiet
- Vorbehaltsgebiet

Windenergie auf See

- Vorranggebiet
- Vorbehaltsgebiet

Leitungen

- Vorbehaltsgebiet

Schutz & Verbesserung der Meeresumwelt

- Vorbehaltsgebiet Naturschutz
- Vorbehaltsgebiet Seetaucher

Rohstoffe

- Vorranggebiet
- Vorbehaltsgebiet

Forschung

- Vorbehaltsgebiet

Nachrichtliche Darstellung

- Grenze zum Küstenmeer
- Grenzen der AWZ
- Internationale Grenze
- Militärische Übungsgebiete
- Fehmarnbeltquerung
- Nordansteuerung*

*Außenreede der Häfen Stettin und Swinemünde: Dieser Bereich ist vom Raumordnungsplan wegen widersprechender Rechtsauffassung nicht erfasst. Nach deutscher Ansicht handelt es sich um einen Teil der deutschen AWZ, wobei hieraus im Verhältnis zu Polen keine Rechte und Pflichten geltend gemacht werden. Nach polnischer Ansicht ist dieser Bereich Teil des polnischen Küstenmeeres.

Koordinatensystem: ETRS89 LAEA
Planungsmaßstab: 1:400.000
BSH / 01 - Januar 2020

Governance - Level Playing Field

- EMFF/EMFAF Subsidies for the conservation and sustainable intensification of pond aquaculture
- Legislation concerning feed and therefore nutrient discharge for trout aquaculture in Denmark.



Environmental Interactions – Climate Change

- Adaptation to potential climate change impacts



<https://www.hofer-forellen.de/geschichte.html>

Environmental Interactions - Biodiversity

- Predator control



(© Reinhold Hanel, Thünen)

Disease Control, Animal Health and Welfare

- Development of new agents against fish diseases with focus on food safety and maximum environmental protection



(© Felix Teitge, Fish Disease Uni, Univ. of Vet. Med., Hannover)

Disease Control, Animal Health and Welfare

- Environmental enrichment
- Indicator development



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Capacity building and skill development

- bringing innovation to farmers and across the value chain, and education at all levels



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Way Forward

- Investigation of conflicting policy frameworks: environmental, water and building restrictions and their effect on aquaculture production and ecosystem services
- Critical evaluation of the prospects for European aquaculture in international competition (ecological and economic evaluation).
- Analysis and evaluation of the current procedures in the context of an expansion of inland aquaculture (regional approach, inspired by National Aquaculture Strategy Plans required in the EU as a template)

Final Conclusion

**Efforts of ALL STAKEHOLDERS are
necessary to increase contribution of
aquaculture to food security, employment
and national income**

Thank you!



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