

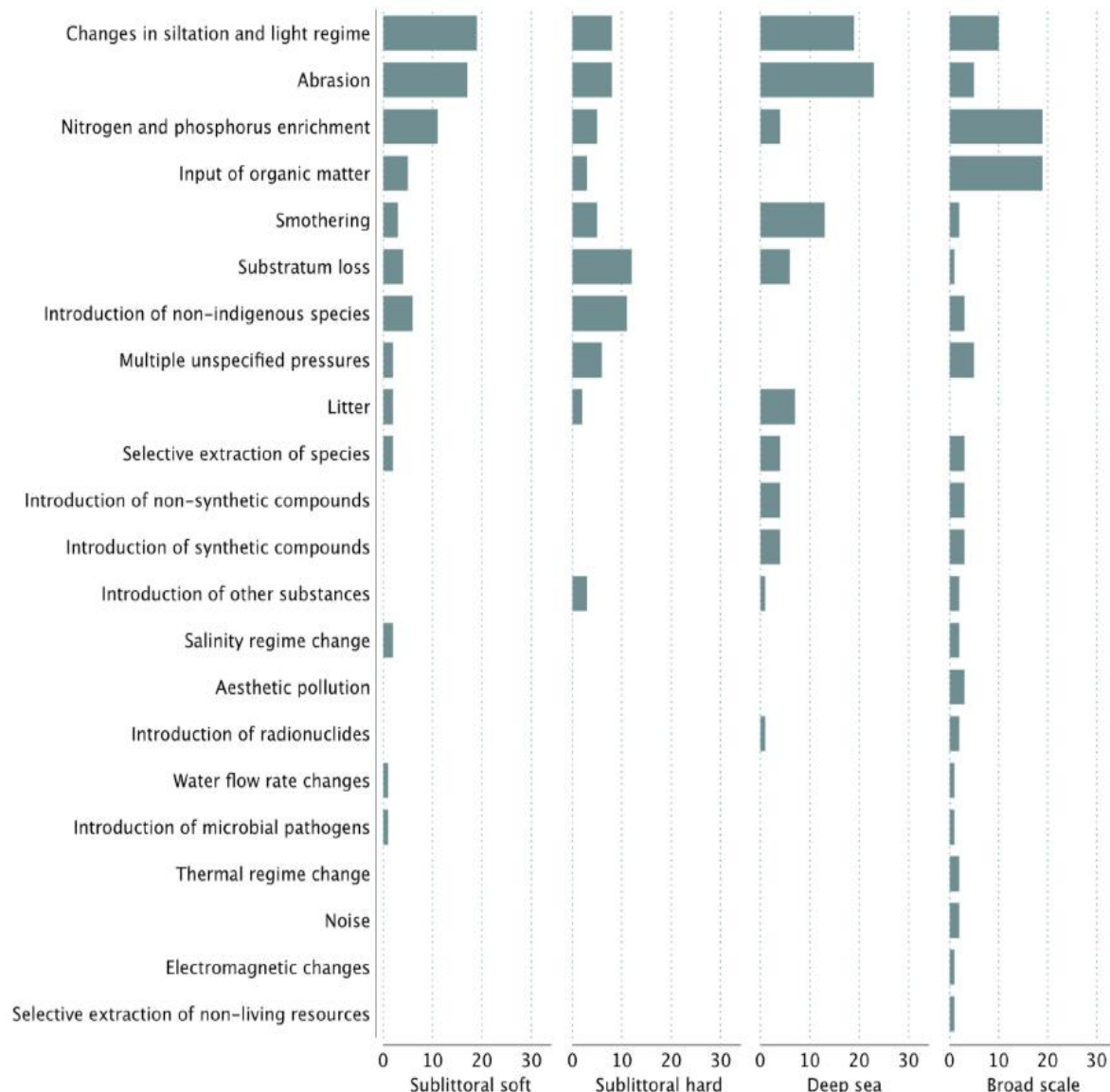
Integrated low-trophic aquaculture: a novel approach to nutrient sequestration

Jonne Kotta

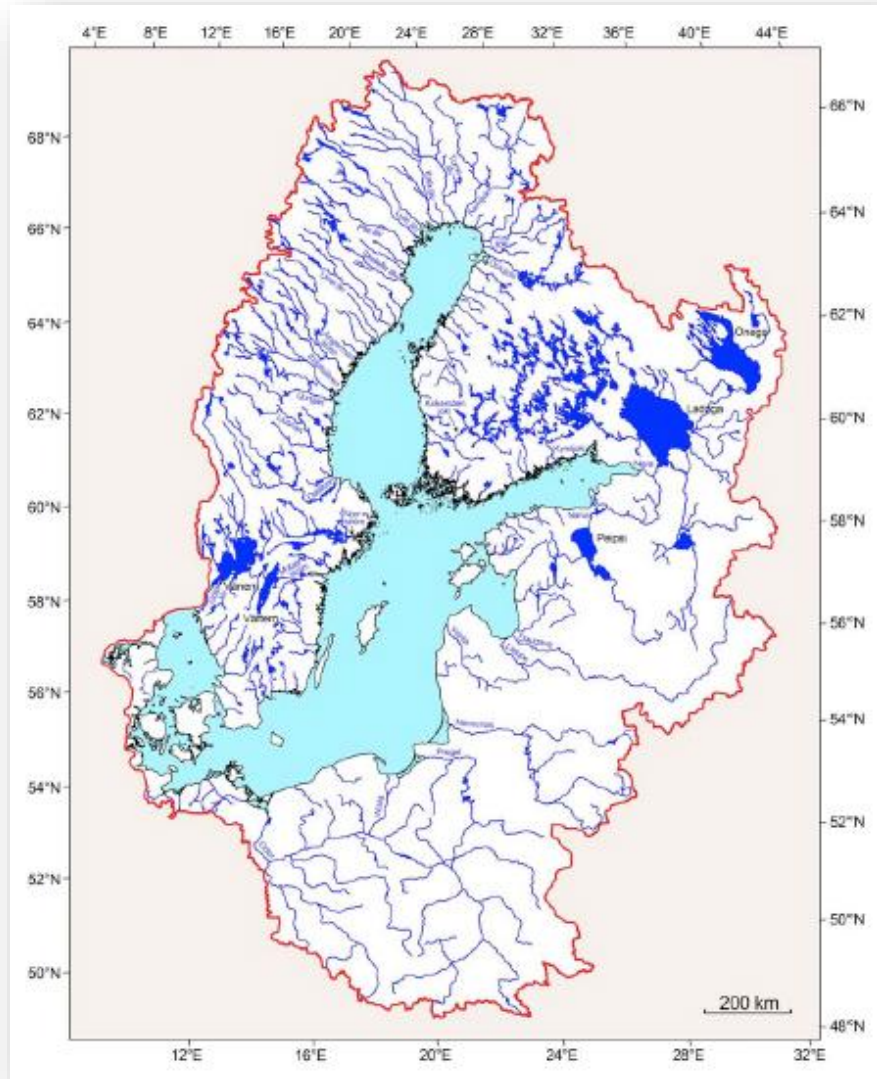
Estonian Marine Institute, University of Tartu

HUMAN ACTIVITIES HAVE IMPACTS

Human induced pressures become more intense and diverse and result in the loss of habitats



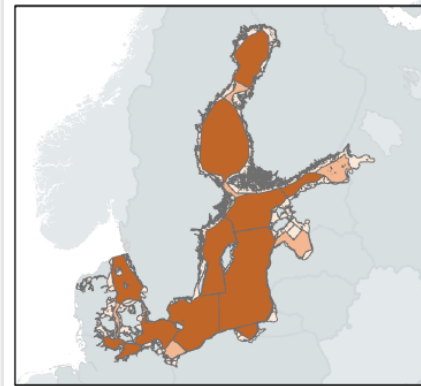
Baltic Sea is a transboundary ecosystem with large watershed area



Eutrophication integrated assessment results

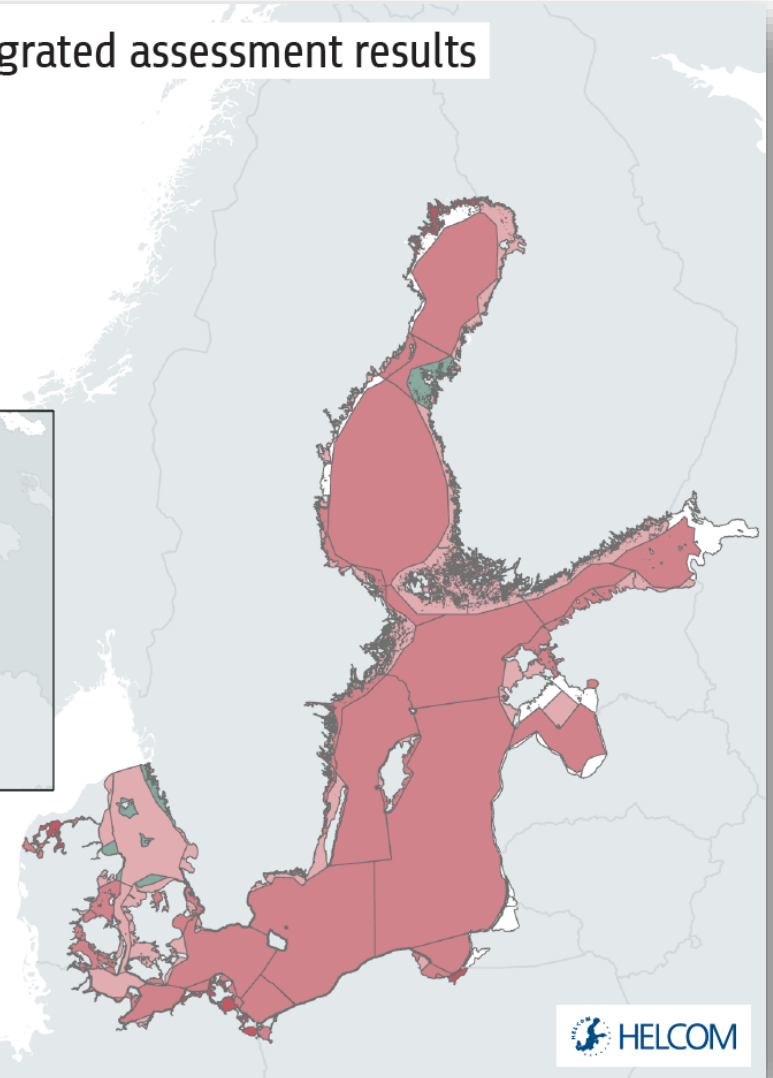
EQRS

- High
- Good
- Moderate
- Poor
- Bad
- Not assessed



Confidence

- High
- Moderate
- Low





NP

developing cultivation methods

developing novel foods

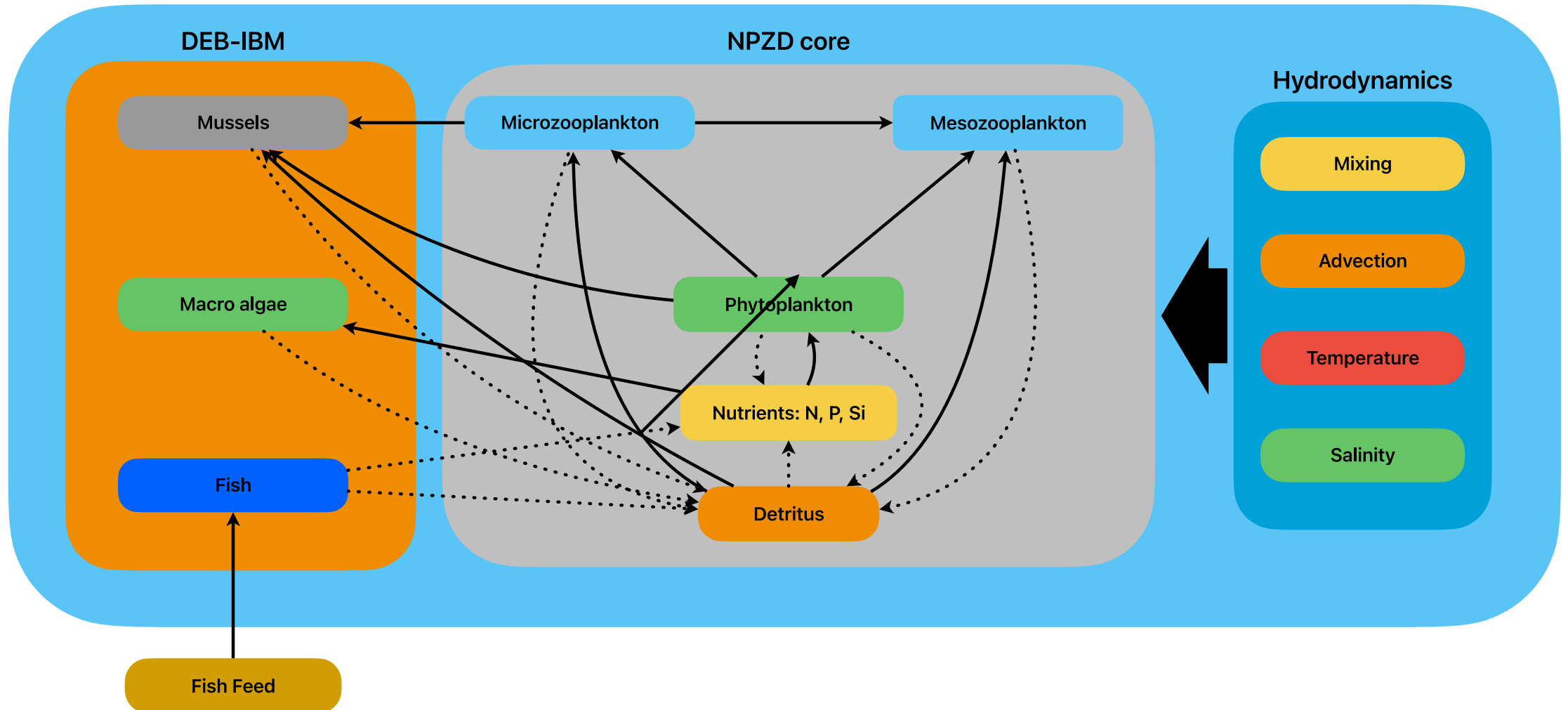
assessing environmental
impacts (positive, negative)

A potential of algal and mussel farming

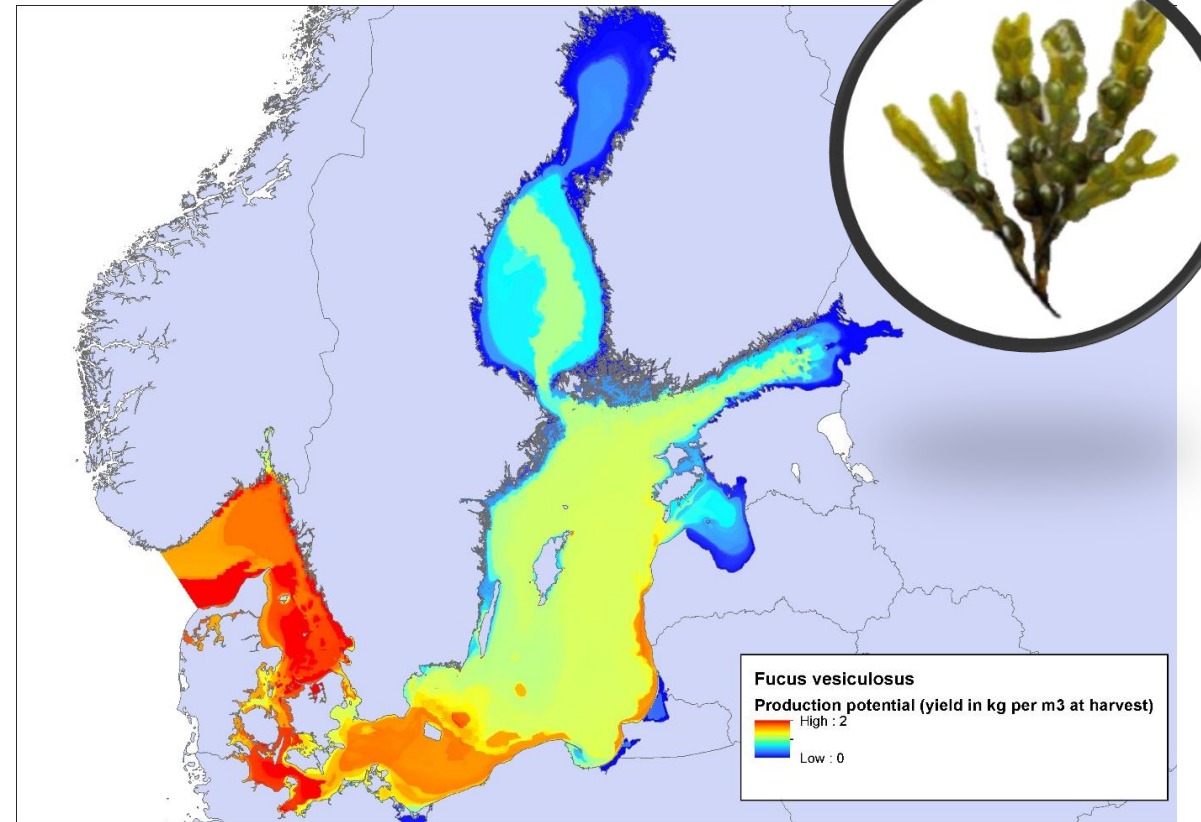
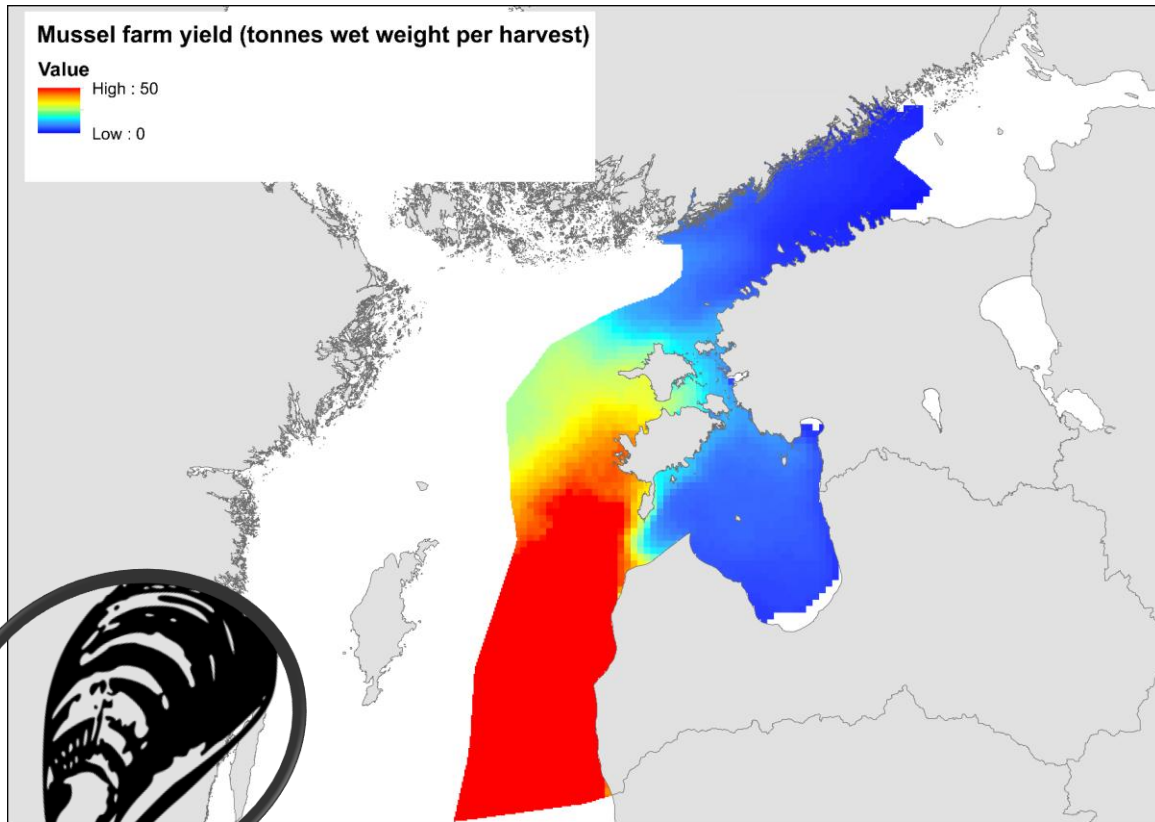


IMTA modelling

Ecosystem Model



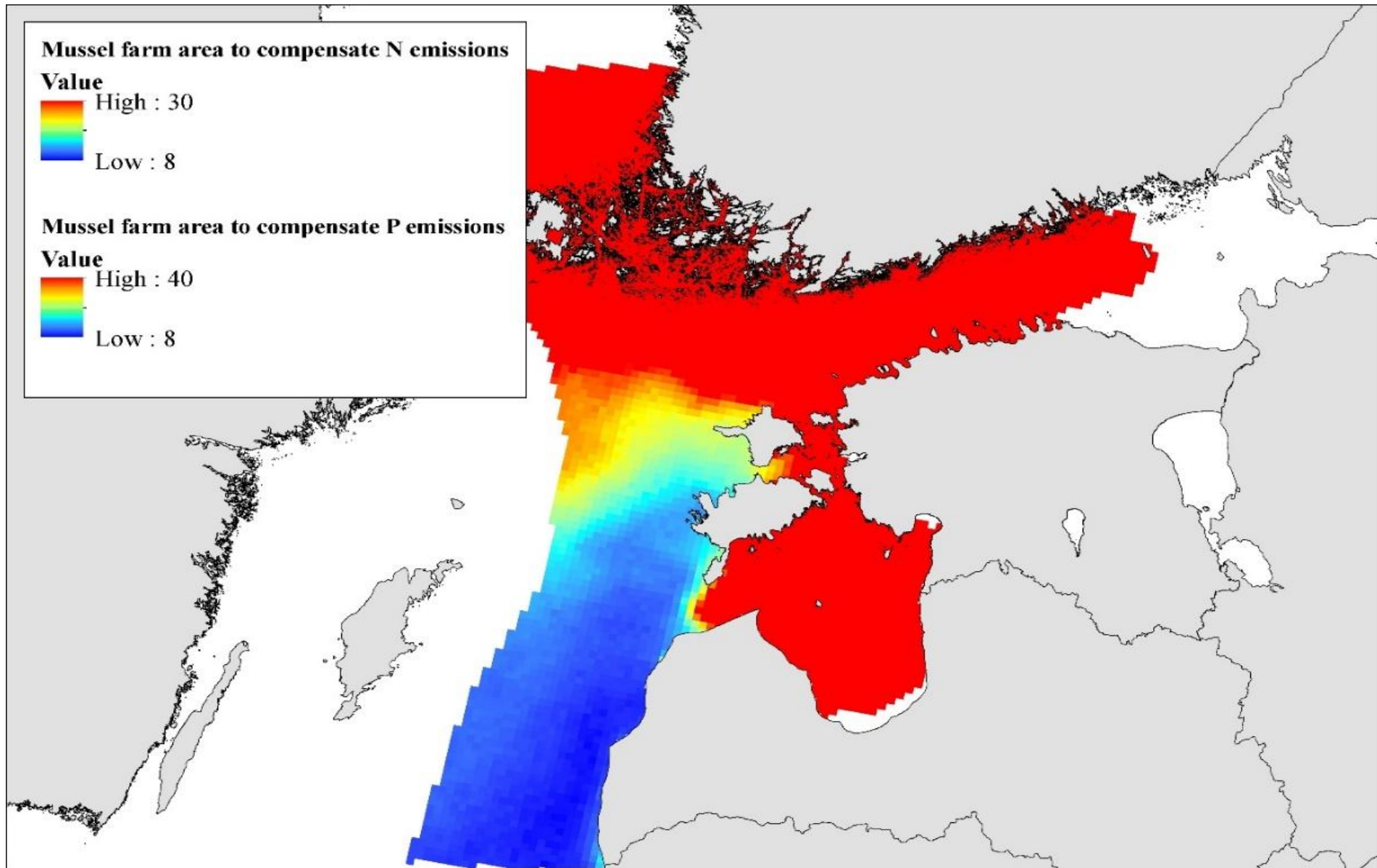
Mussel and seaweed farming yields + NP removal



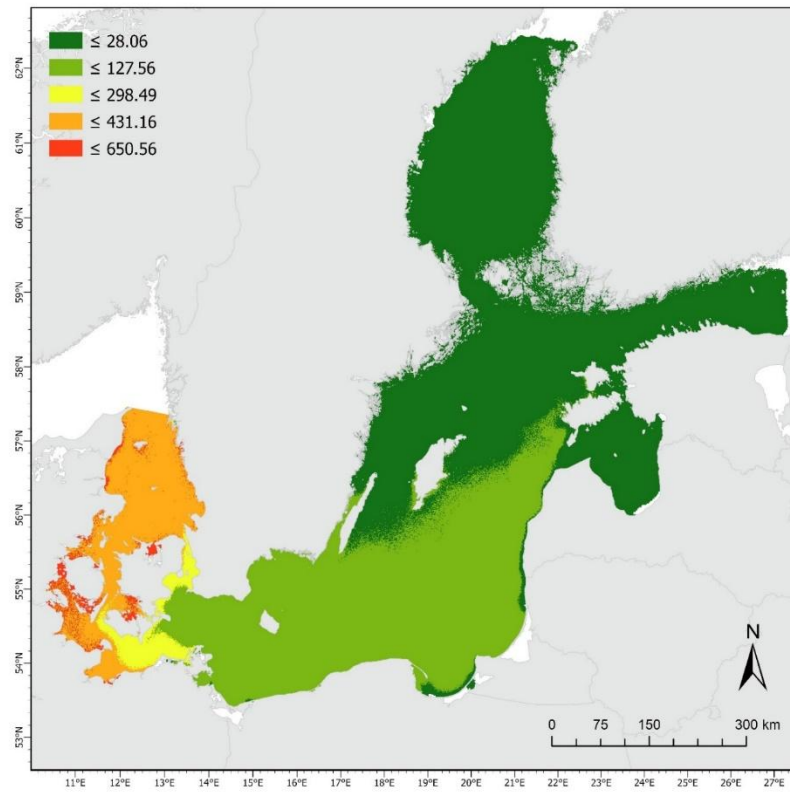
Scientific support for zero emitting IMTA (Integrated Multi-Trophic Aquaculture) solutions



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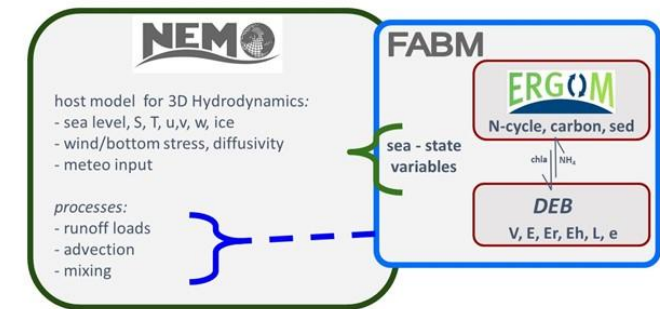
ODSS



Environmental carrying capacity modelling

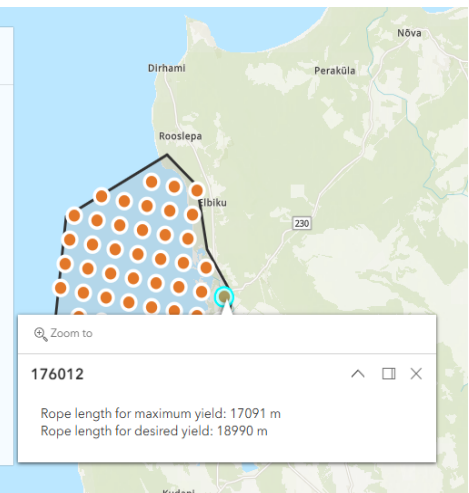


Linking 3D hydrodynamics with biological process modelling (e.g. dynamic energy budget models)

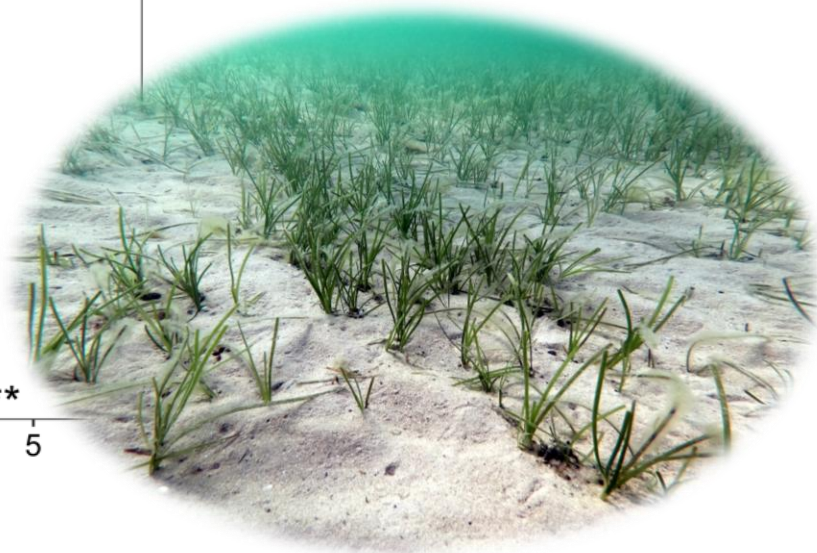
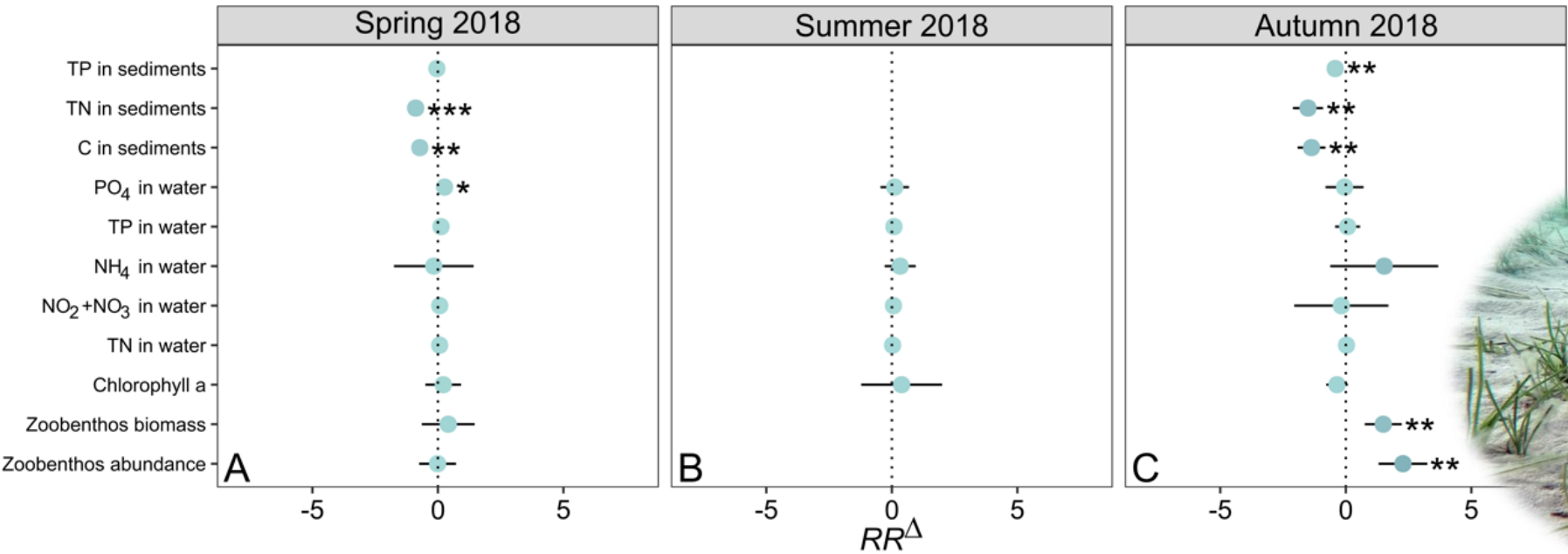


Human activities				
Name	Average	Area (km2)	Percent (%)	Count
Dredging	0	0	0	0
Windpark	0	0	0	0
Fish farming	0	0	0	0
Shipping	4.39	14.09	24.76	9
Underwater cables	0.11	0.19	1	
Pelagic trawling	0	0	0	0
Benthic trawling	0	0	0	0
Harbours	0	0	0	0
Mussel and algal cultivation	0	0	0	0
Coastal defence	0	0	0	0
Extraction of minerals	0	0	0	0
Marine plant harvesting	0	0	0	0
Tourism and leisure activities	0	0	0	0

Nutrient removal		
Name	Average	Area (km2)
N Removal by mussels (Mytilus, g/m rope @ 2 years)	4.61	36.21
P Removal by mussels (Mytilus, g/m rope @ 2 years)	0.34	36.21
Mussel growth (kg/m rope @ 2 years)	0.71	54.89
Fucus growth (growth rate in kg/km2)	0.45	56.9
Ulva growth (growth rate in kg/m)	0.54	56.9
Areal N removal estimate by Fucus (kg/5ha)	8.13	56.9
Areal P removal estimate by Fucus (kg/5ha)	1.62	56.9
Areal N removal estimate by Ulva (kg/5ha)	7.41	56.9
Areal P removal estimate by Ulva (kg/5ha)	1.14	56.9
Saccharina growth (growth rate in kg/m)	0	
Areal N removal estimate by Saccharina (kg/5ha)	0	
Areal P removal estimate by Saccharina (kg/5ha)	0	



Mussel farming: Habitat restoration



Seaweed farming: Positive environmental impact



- Baltic Sea: Low salinity environment.
- Existing cultivation technologies from other seas are not viable.
- Necessity to use local species and forms.
- Positive environmental impact.



THANK YOU!

Jonne Kotta

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