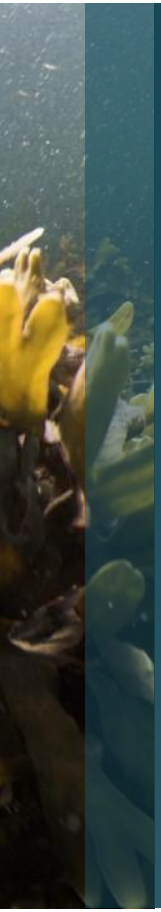


Mapping macroalgal production and farming challenges in the Baltic Sea region

Francisco R. Barboza, University of Tartu

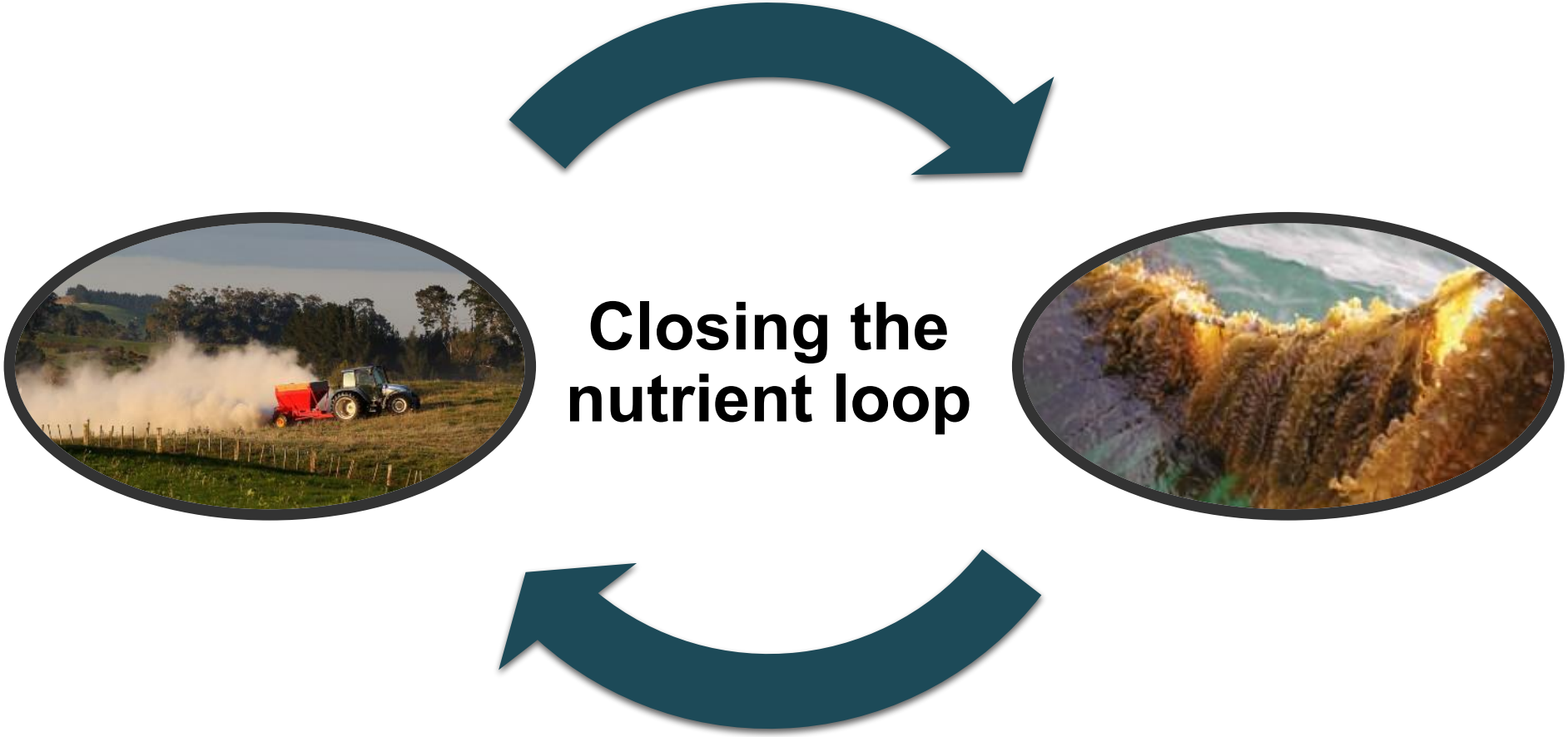
Daniel Franzén, KTH Royal Institute of Technology

Baltic macroalgae conference

Online, 06.05.2021

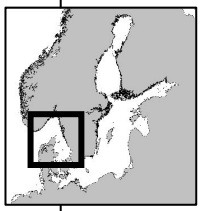
Objective

Identify areas in the Baltic Sea that have environmental conditions conducive to macroalgal production



Selection of target species

West Baltic Sea



Saccharina latissima

Baltic proper and adjacent basins

Fucus vesiculosus
Ulva intestinalis

Knowledge and data

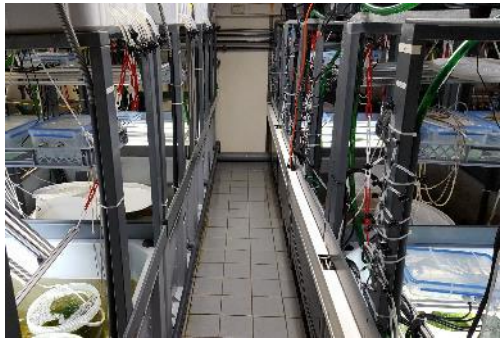
Knowledge and data are coming from:

Previous experiences

Earlier algal cultivation and harvesting experiences

Experimental evidence

Other existing experimental evidence on macroalgal growth

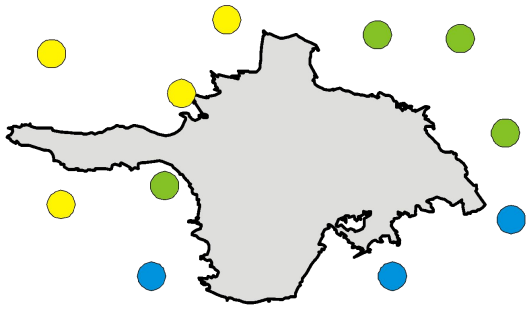


European infrastructure

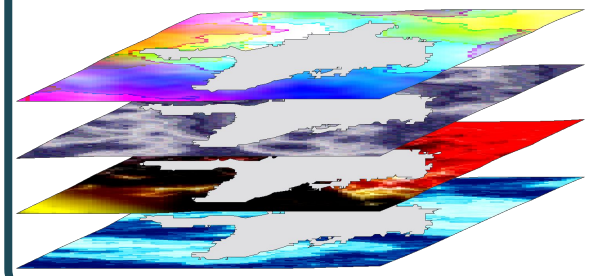
European infrastructure

Spatial modelling

Response variable:
e.g., point data of species

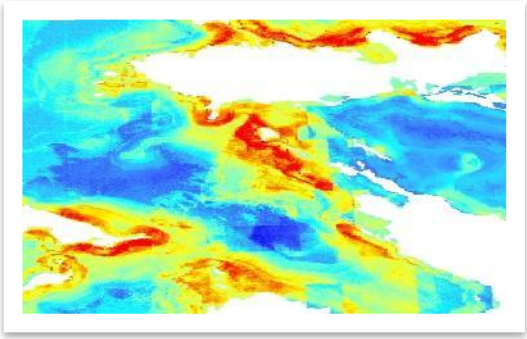


Predictor variables:
GIS-layers of environmental data



Machine learning
combined with statistics

Prediction:
suitable farming areas

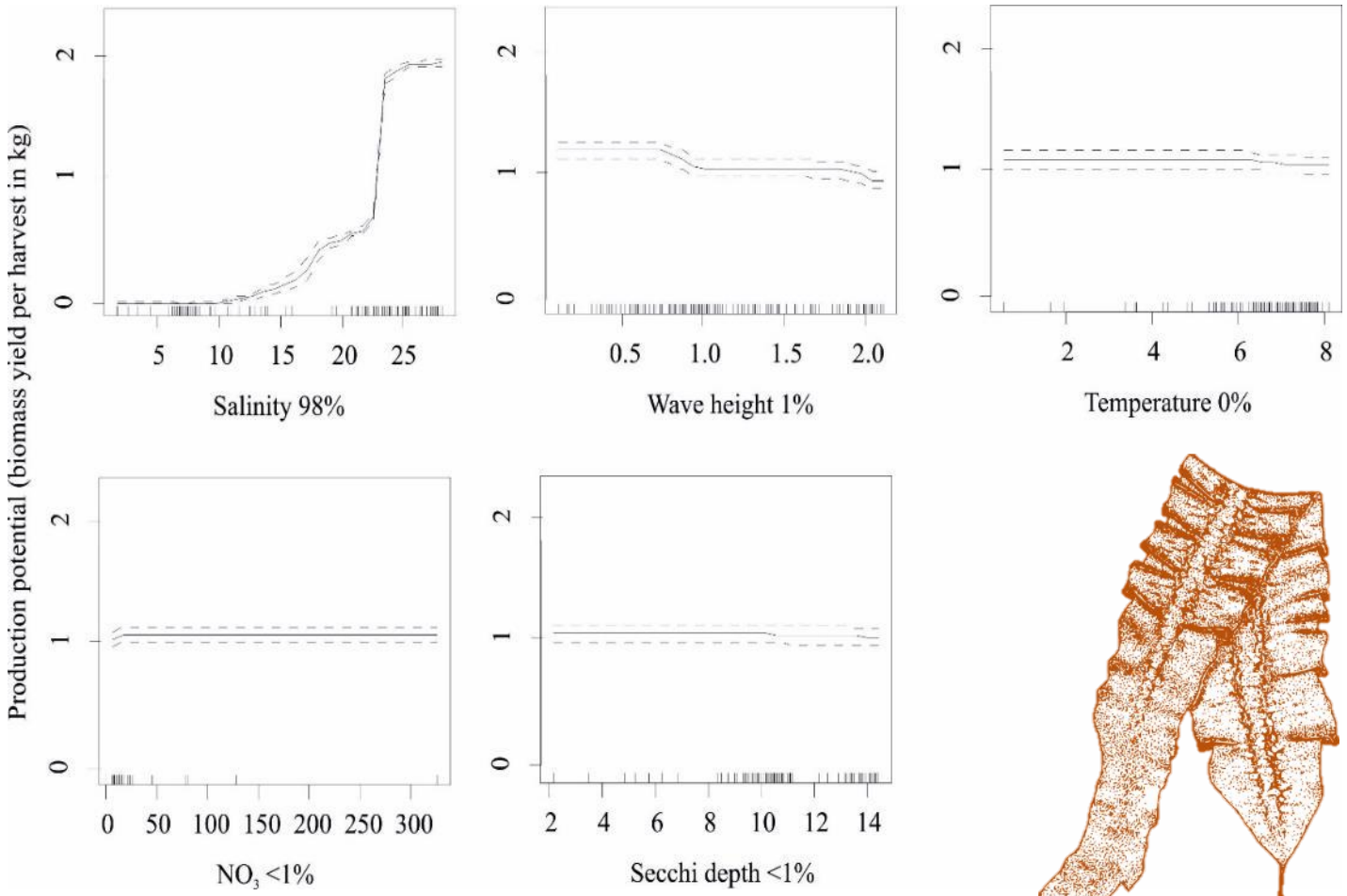


Model assessment:

- importance of predictors
- relationships between predictors and response
- model validation

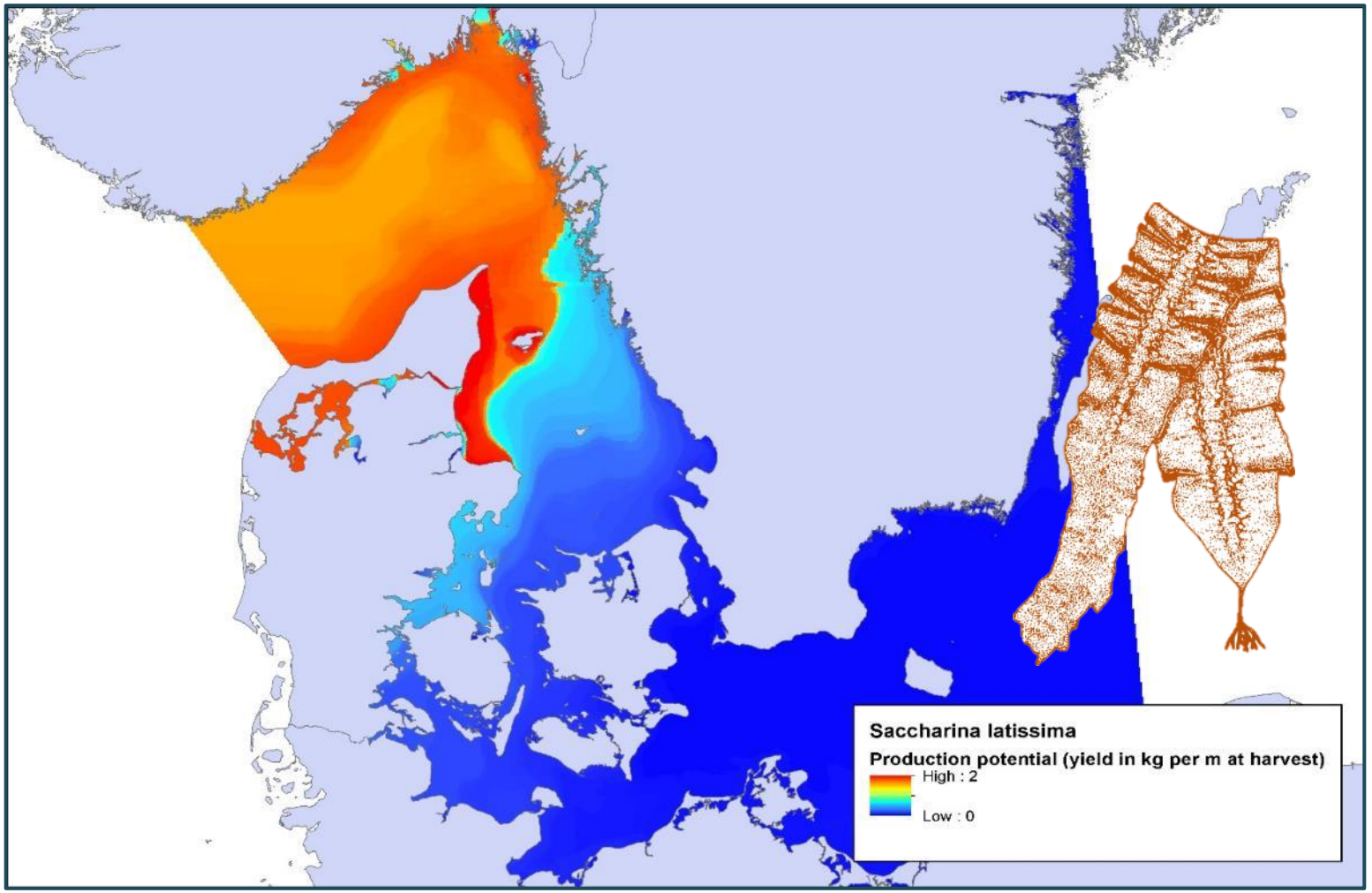
Saccharina latissima

Response curves



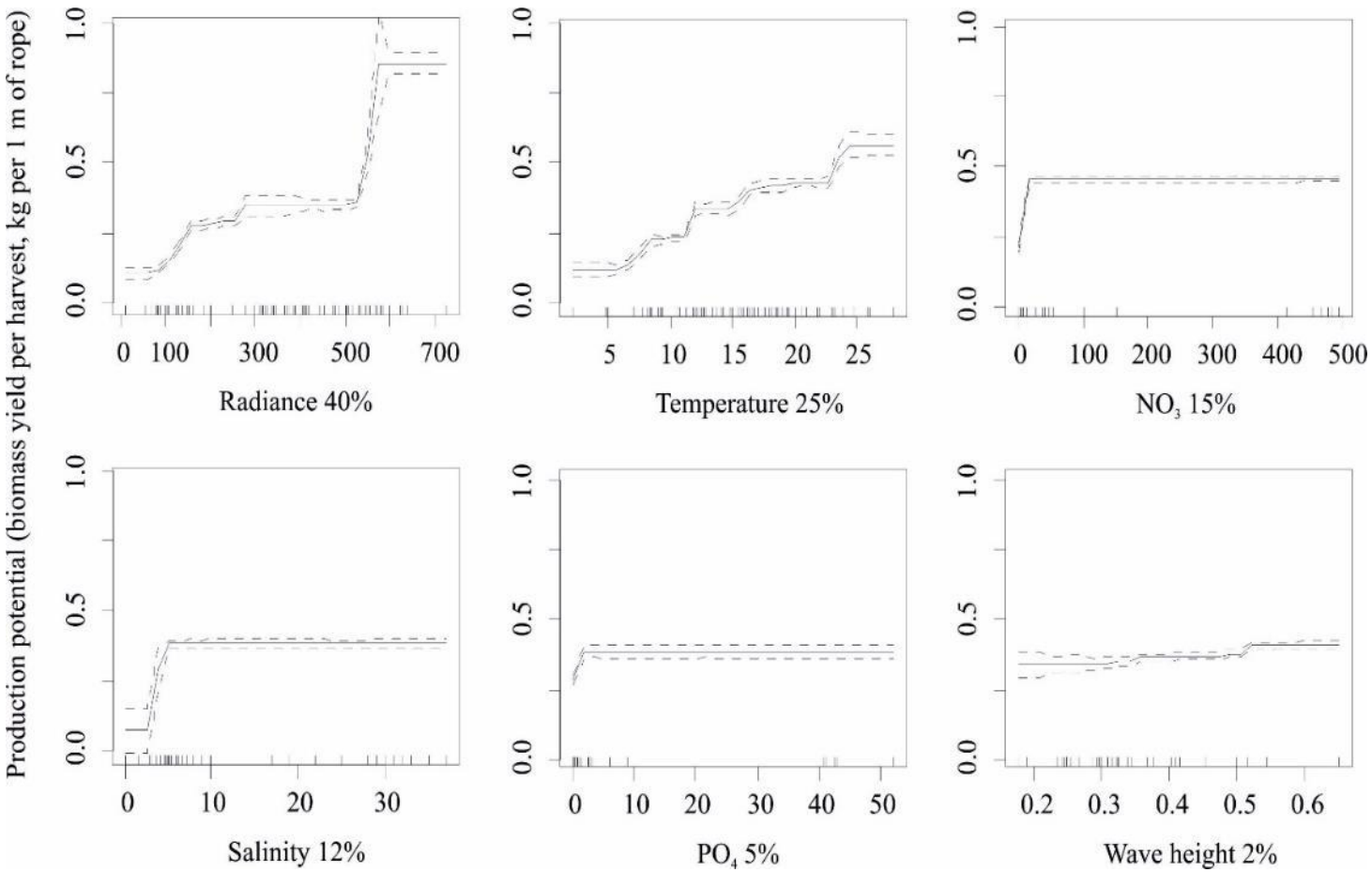
Saccharina latissima

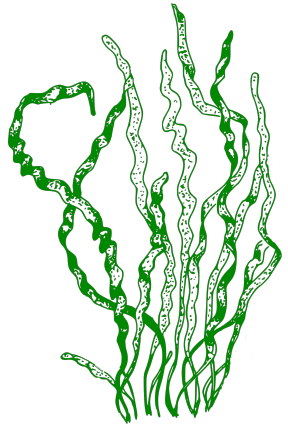
Production potential



Ulva intestinalis

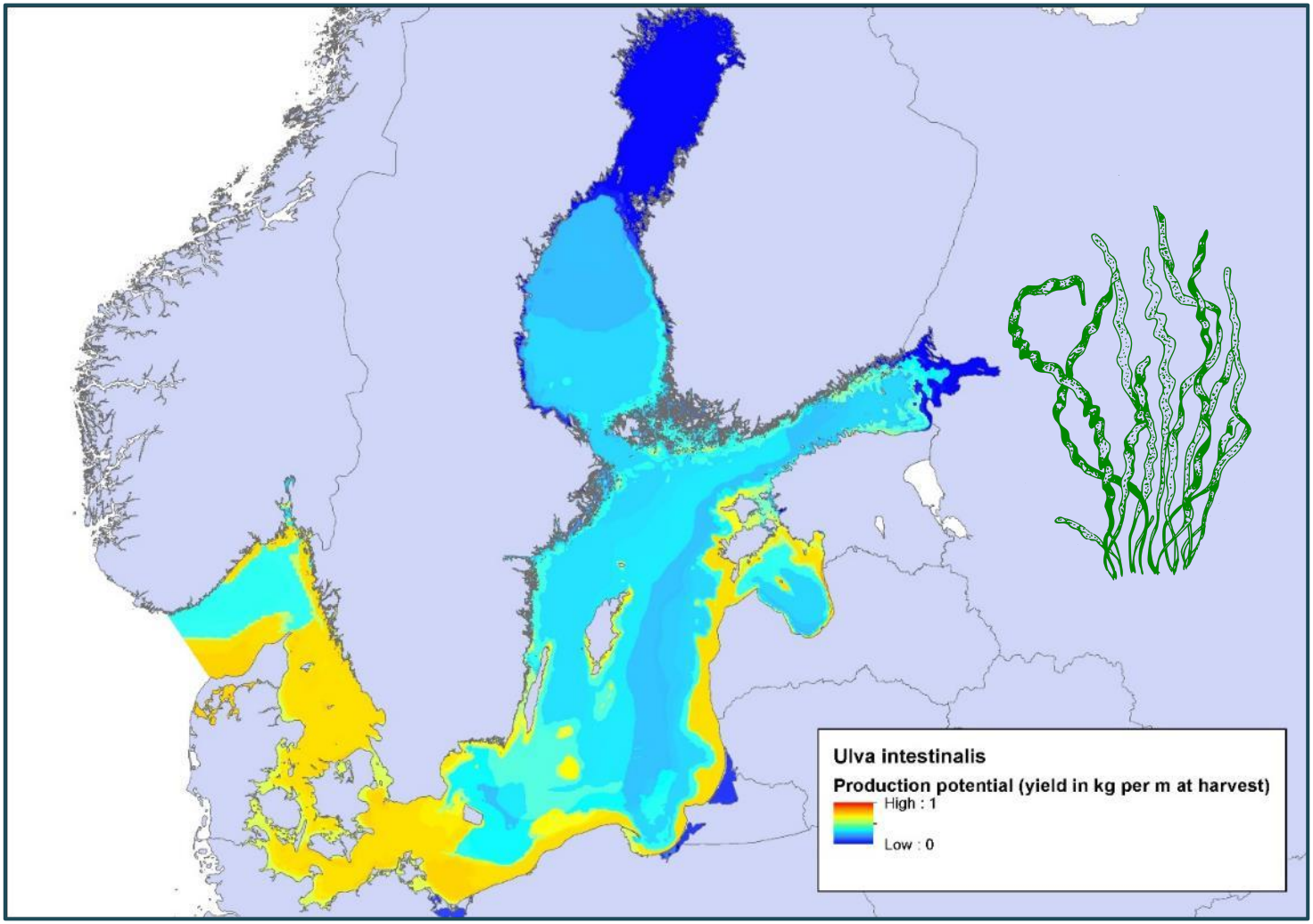
Response curves





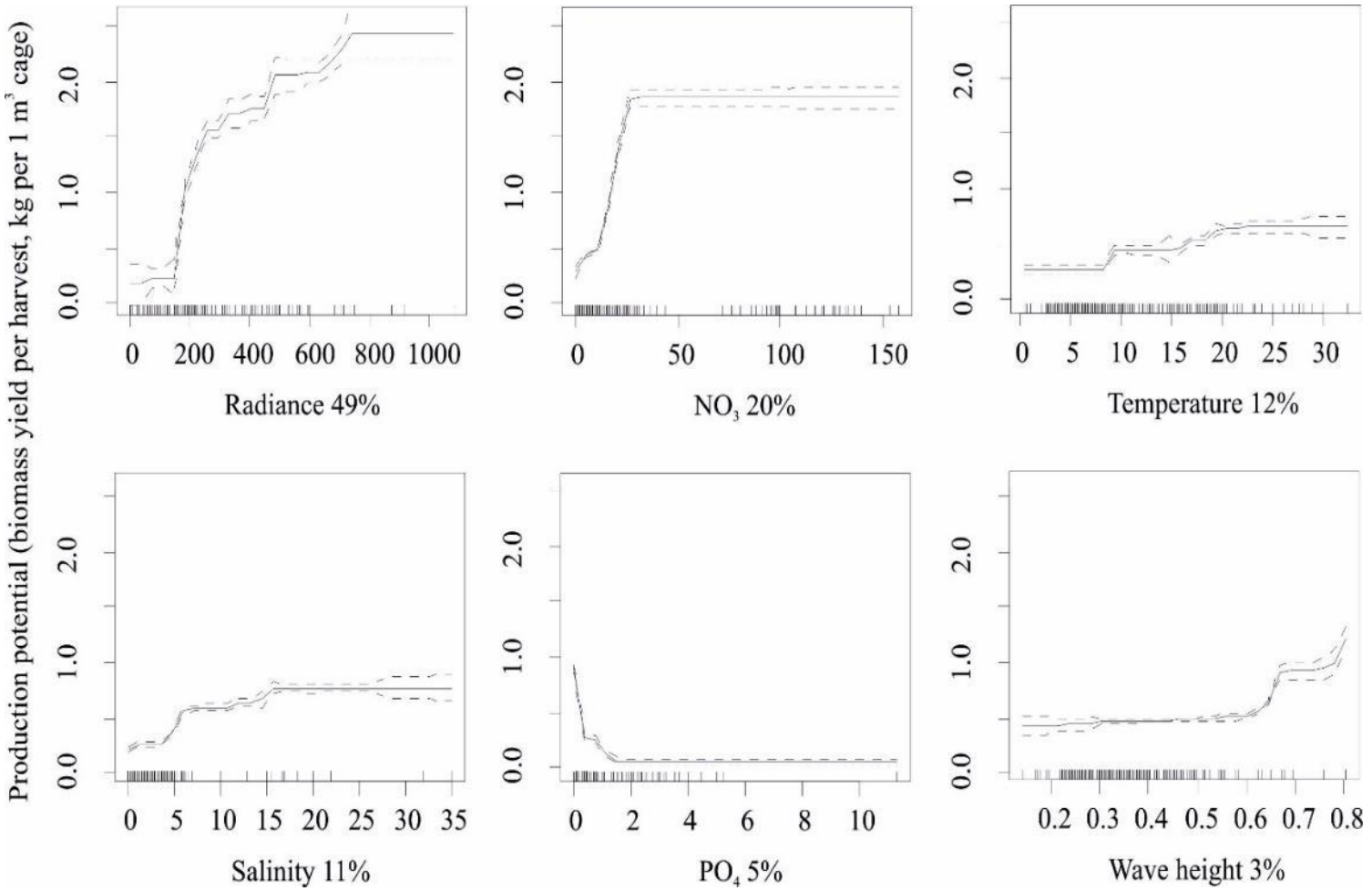
Ulva intestinalis

Production potential



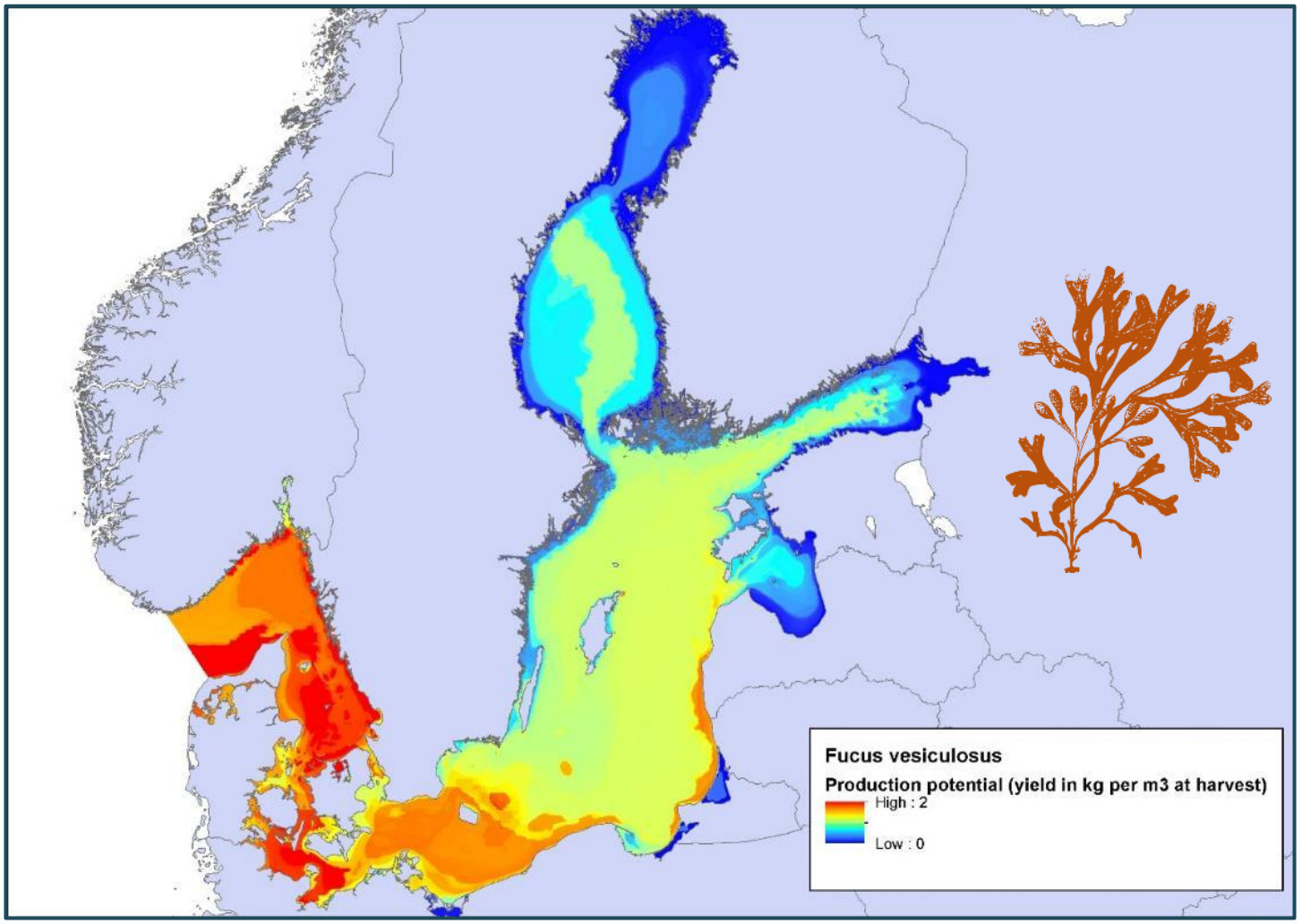
Fucus vesiculosus

Response curves



Fucus vesiculosus

Production potential



ODSS – Operational Decision Support System

BBG GRASS Menu

Operational Decision Support System (ODSS)

The application for the Baltic blue mussel and macroalgal farming - a platform enabling upload, analysis and sharing of information

Interreg Baltic Sea Region Baltic Blue Growth — EUROPEAN UNION EUROPEAN REGIONAL DEVELOPMENT FUND

Interreg Baltic Sea Region GRASS — EUROPEAN UNION EUROPEAN REGIONAL DEVELOPMENT FUND

GRASS: Growing Algae Sustainably in the Baltic Sea

http://www.sea.ee/bbg-odss

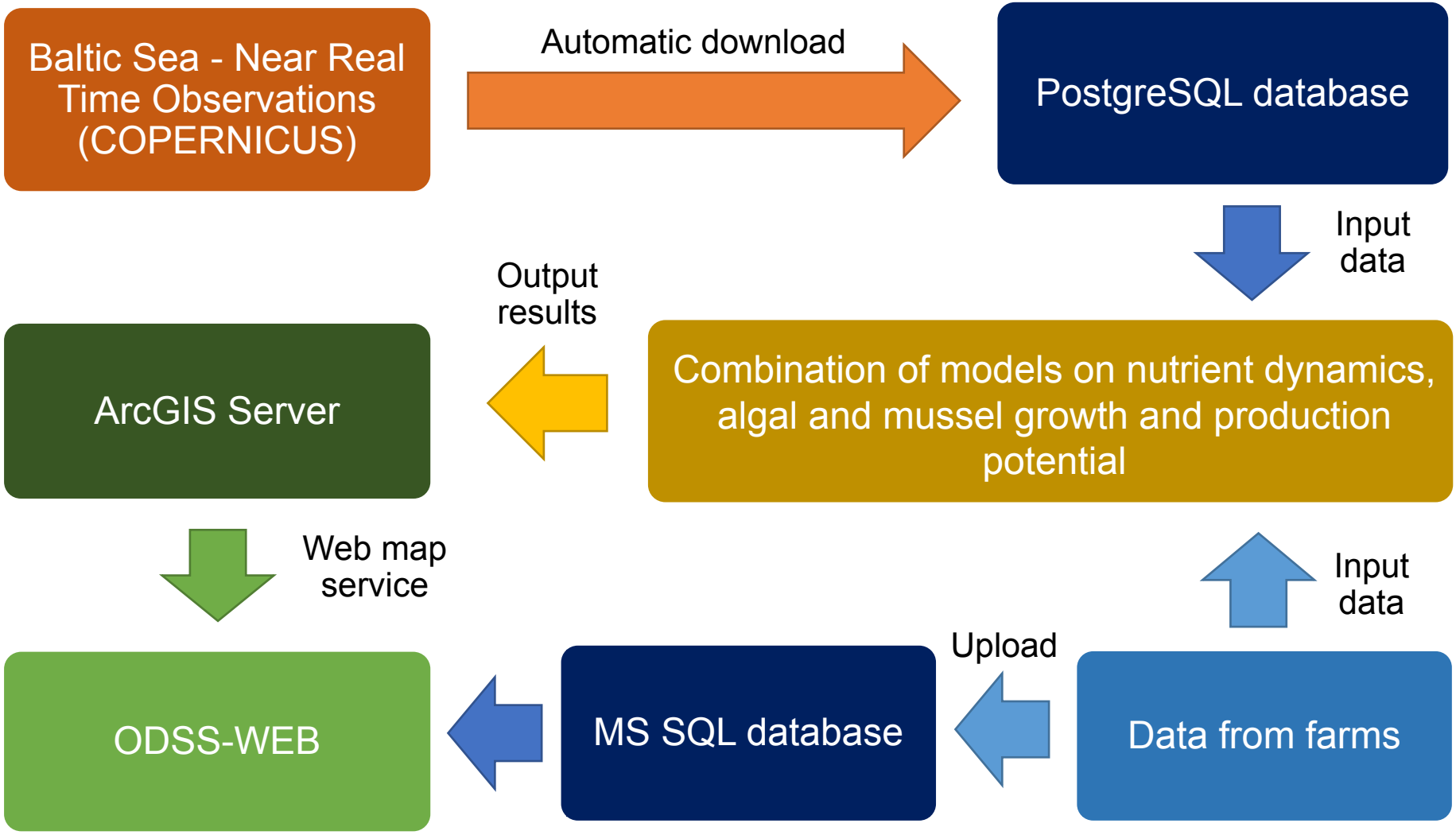
ODSS – Operational Decision Support System

Helps different end-users to **make effective decisions about algal and mussel farming in the Baltic Sea**

These decisions are **based on the best monitoring and modelling data**

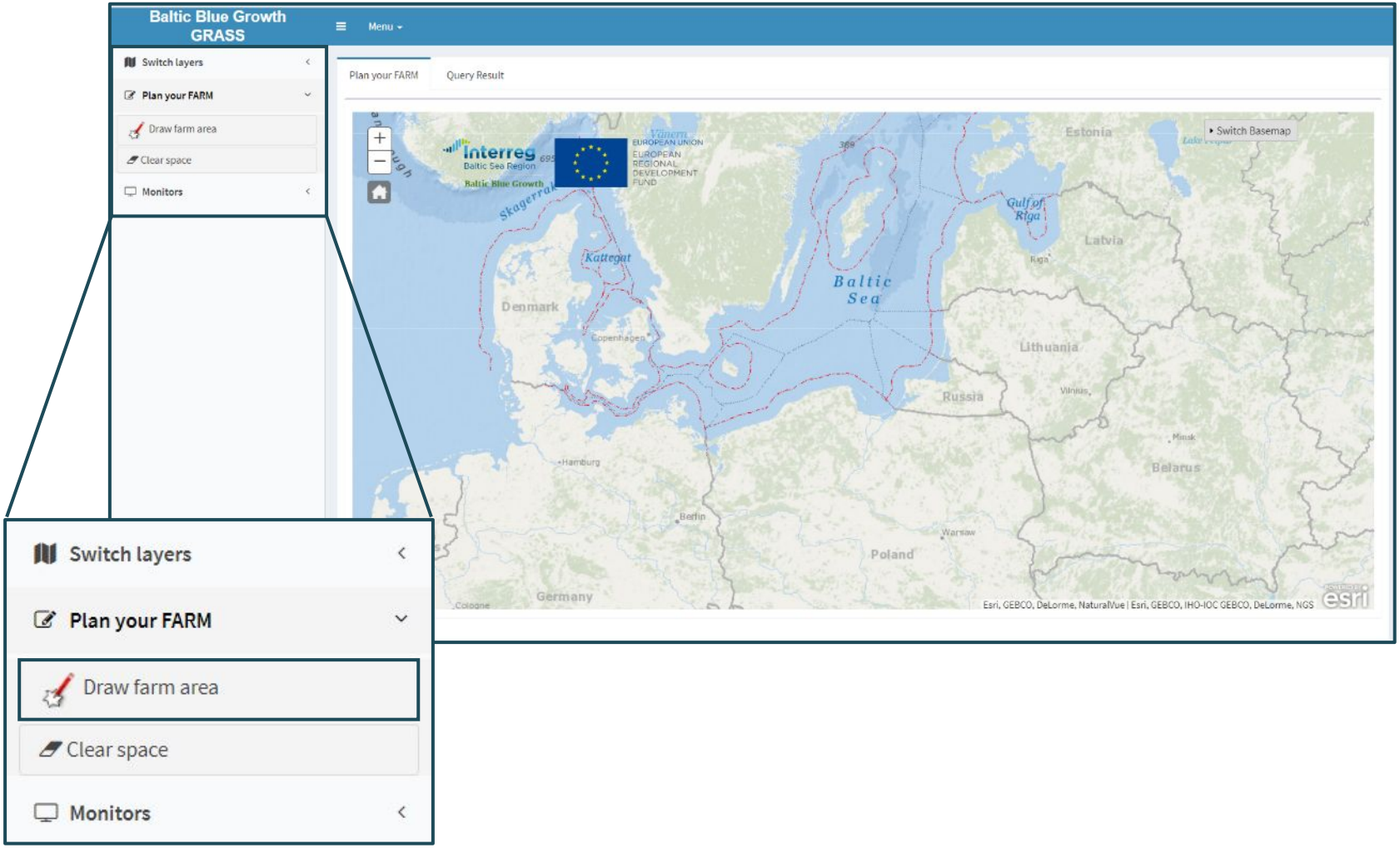
Raises the capacity of end-users, stakeholders and government/county level officials to **achieve objectives along the environmental, economic and socio-economic dimensions of farming**

ODSS data flow



ODSS in action

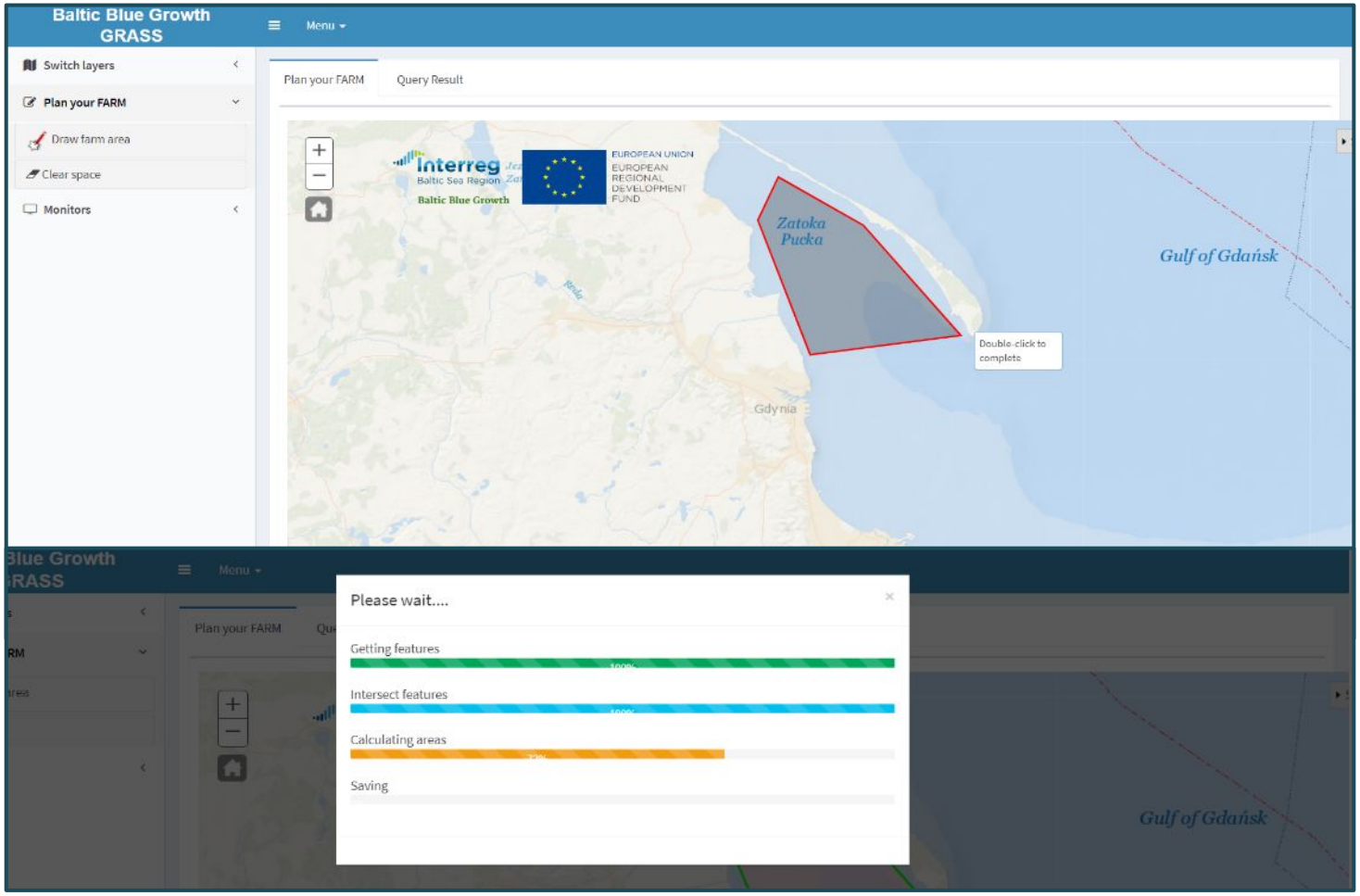
Draw the area of the farm using the integrated tool



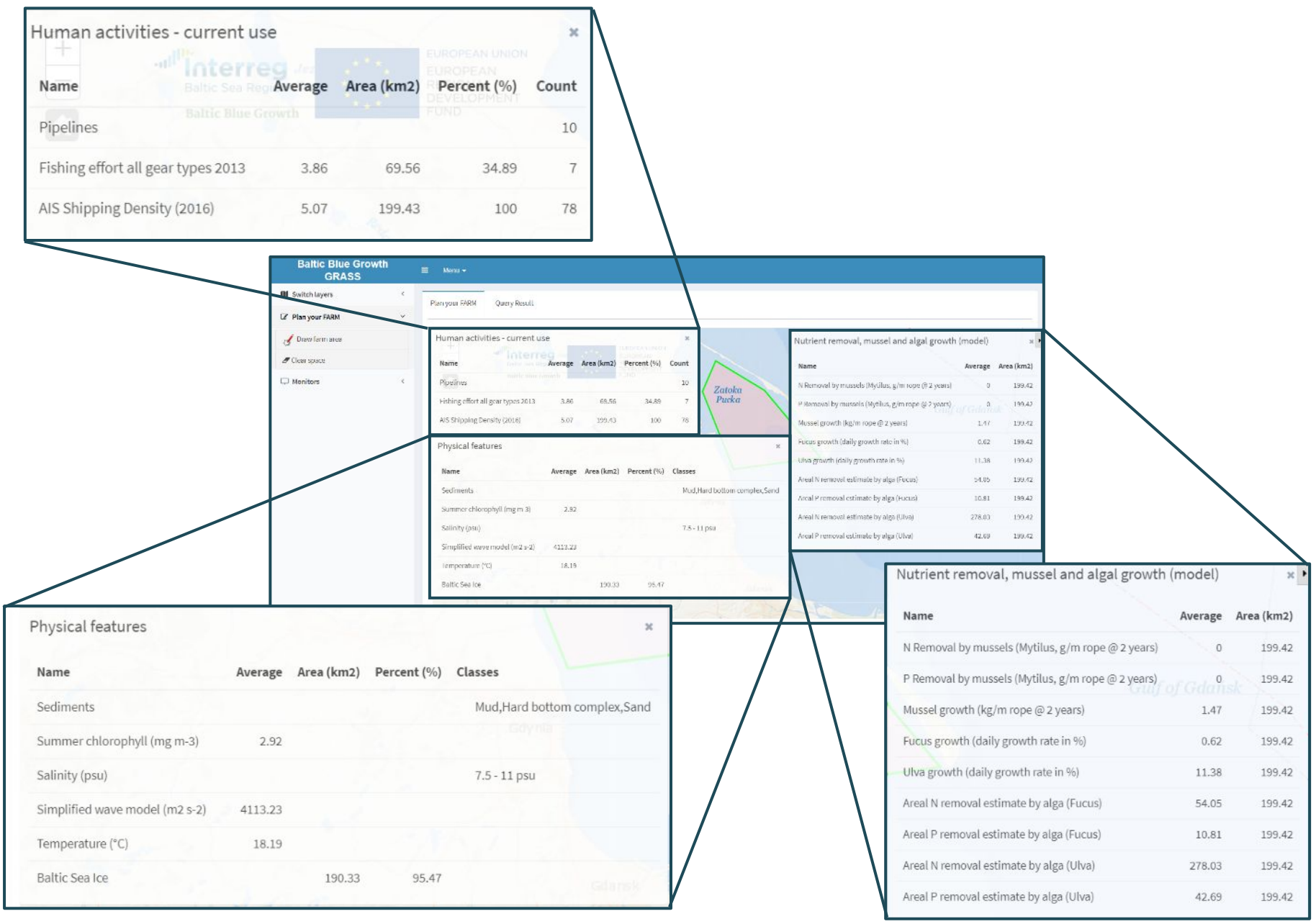
http://www.sea.ee/bbg-odss/Map/MapMain

ODSS in action

Given the selected area the tool will gather the associated information and calculate the features of the planned farm



ODSS in action



Cultivation projects

Country	Project
 Poland	Cultivation at sea, species undecided
 Finland	Planned cultivation at sea, species undecided
 Latvia	Cultivation at sea, species undecided
 Germany	Cultivation of *Saccharina latissima* Cultivation of *Ulva*, *Gracilaria* and *Mastocarpus* spp. (photobio-reactors indoors)
 Sweden	*Saccharina latissima* (long-lines at sea)

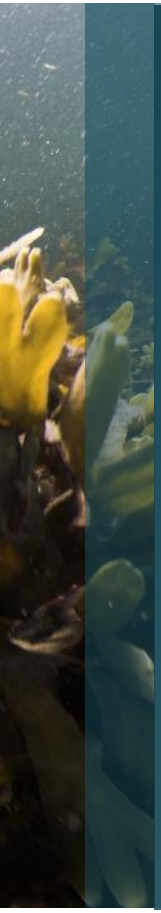
Country	Infrastructure
 Poland	**Ice coverage** requiring **submerged infrastructure**
 Finland	Need of **technological development in all phases**
 Latvia	**No existing infrastructure** **Extreme wind**, **wave conditions** and **ice coverage** are predicted to affect
 Germany	**Poor salinity** conditions
 Sweden	**Offshore exposed infrastructure is a challenge** (nearshore sheltered sites are reliable, productive and cost-effective) **A main bottleneck** to expanding the production is to **dry biomass quickly and effectively at large scale**

Legislation obstacles

Country	Legislation
 Poland	**Complicated permit process** **Permits to work** in areas **where protected species occur**
 Finland	**New permitting activity** (pilot cases needed to assess legislation)
 Latvia	**Legislation is one of the biggest challenges** No special license/permit required but **license process can last 400 days**
 Germany	**Restriction on operations** in coastal and maritime regions **Long permission process (up to 2 years)**
 Sweden	**Lack of clear pathway** for obtaining permissions/licenses **Lack of political support** to help streamline processes

Knowledge and labour costs

Country	Organization
 Poland	**Lack of knowledge** regarding **cultivation/harvest Limited scientific knowledge** on reproduction and growth of species
 Finland	**Lack of knowledge** and expertise in **farming** **High labour costs**
 Latvia	**No experience yet**, lessons learned from mussel farming will be applied
 Germany	**High staff costs** **Low production compared to workload**
 Sweden	**No identified challenges**



Thank you!