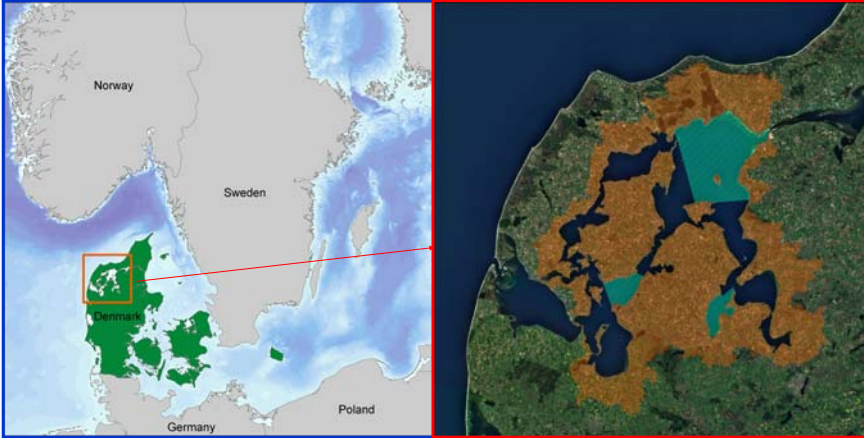


POLICY ISSUE: Interaction between eutrophication and mussel production

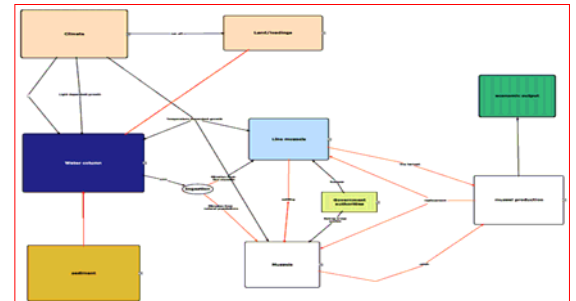
Limfjorden is situated in Northern Jutland, Denmark. Today, mussel fishery is the most important harvest yield in the fjord. The policy issue was decided on by the SSA team, based upon the stakeholder foci of "no fish" and "hypoxia" as well as on data availability.



AREA AND SYSTEM BOUNDARIES

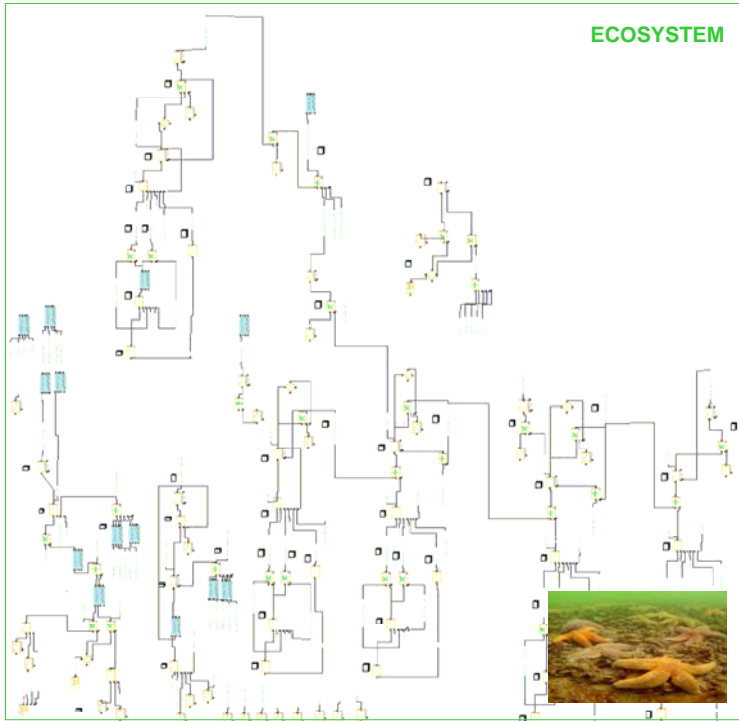
With a coastline of 1000 km and a surface area of 1500 km², the Limfjord is the largest former fjord in Denmark. Today, it has a western inlet from the North Sea and eastern channel connecting with the Kattegat. The catchment area of the fjords is 7528 km², of which 62% of the land is occupied by agriculture.

Both geographically and virtually, the SSA 5 area includes the central part of the Limfjord with associated catchment areas (orange area). Empirical modelling will be carried out on the three subareas: Kås Bredning, Løgstor Bredning, and Skive Fjord (turquoise areas).



The conceptual model was prepared as a basis for the actual simulation model and contains all the variables and processes regarded to be of relevance to the policy issue. As part of the development of the simulation model, several decisions and priorities have been made concerning what to include in the model. Hence, the conceptual model has been revised.

Formulation of the ecological component



Model components were formulated and blocks build based on the conceptual model of the DS. Lists (see hard copy below) includes the 12 external and internal input variables (name, explanation, SI unit, type, initial value, note) and the 53 processes (ref #, name, explanation, equation, unit, type, source, note).

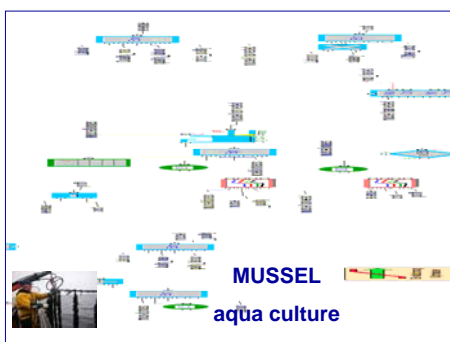
An auxiliary model (empirical model for the Limfjord) of the relationship of N and P load to primary production was used. Thus, the nutrient dynamics are not modelled herein.

The limfjord_full.mox is the "ballpark" edition of the ecological simulation model as it has been developed in Extend software. Information can be obtained in each component under the comments as well as all equations, initial values, and the graphical layout illustrates the connections between model components.

Challenges & obstacles:

- Lack of relevant and complete time series data, particularly on socio-economic elements
- Limited empirical knowledge of relationships between line and bottom mussel growth and effect on nutrient load, oxygen deficiency and harmful algal bloom events
- Lack of cross-sectoral common language and terminology

Formulation of the socio-economic component



The socio-economic component is divided into two separate models, one for mussel aqua culture on lines in the water column, and one for mussel fishery on the bottom by dredging. Relevant variables and processes were listed (see hard copy below) and model components formulated and build using Extend. Auxiliary models (production model, bio-economic model) are currently being validated.

The economy_spicosa_aqua_cul_v1.mox and economy_spicosa_sea_bed_v3.mox are the "ballpark" editions of the two simulation models. Information can be obtained in each component under the comments as well as all equations, initial values, and the graphical layout illustrates the connections between model components.

