



Investigating mutual benefits

of cultivating two large brown algae species near Fredericia waste water sewage plant

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Aim

Investigate the potential of marine brown algae cultivation as bioremediation tool in inner Danish waters and near nutrient rich point sources to mitigate eutrophication.

Background

Nutrients from municipal waste water treatment plants are discharged to inner Danish coastal waters. By cultivating large brown algae near outflows, the nutrients could be recaptured and brought back to land as feedstock for production of energy, feed or high value products. (Tsagkamilis *et al.* 2010).

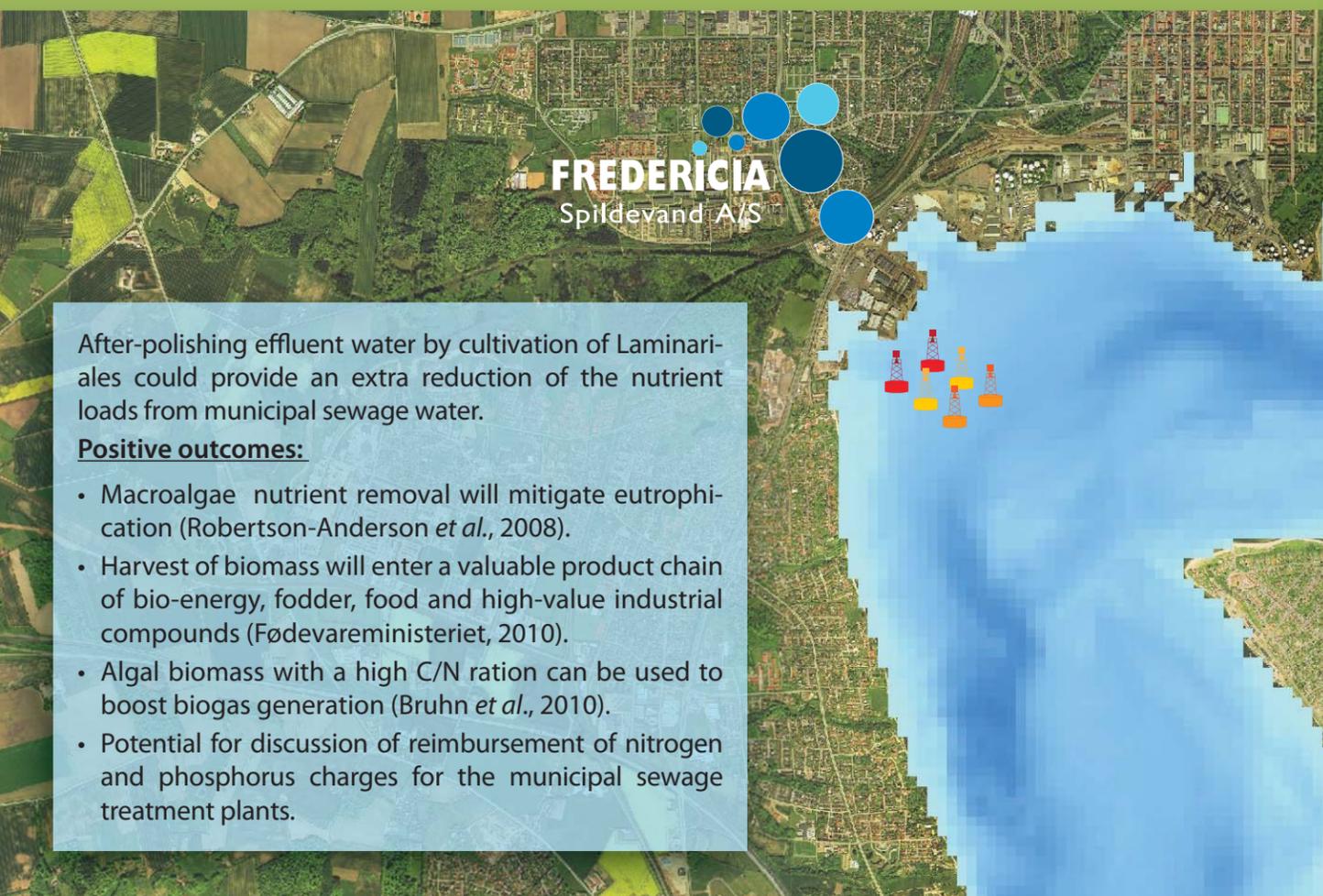
Method

- Deploying "algae-grow-out-units" with the two large brown algae *Laminaria digitata* and *Saccharina latissima* along a nutrient gradient from the reject water outflow.
- Assessing the success of two methods for inoculating seedling-lines with gametophyte cultures or using direct spore release.
- Lab experiment: Simulating and testing growth, biomass production, bioremediation potential and efficiency as well as biochemical composition (pigments, sugars and C/N ratio) of algae discs in a factorial design of light and nutrient using ecological values relevant for inner Danish coastal waters.
- Lab experiment: Monitoring the fate of nitrogen (DON, N₂, N₂O and algae-N) past algal uptake in a bioremediation aspect.

Outcome

- Estimation of possible ecological and economic benefits of brown macro algae biomass production near discharge point of wastewater treatment plants.

2 m *L. digitata* in inner Danish waters.



After-polishing effluent water by cultivation of Laminariales could provide an extra reduction of the nutrient loads from municipal sewage water.

Positive outcomes:

- Macroalgae nutrient removal will mitigate eutrophication (Robertson-Anderson *et al.*, 2008).
- Harvest of biomass will enter a valuable product chain of bio-energy, fodder, food and high-value industrial compounds (Fødevarerministeriet, 2010).
- Algal biomass with a high C/N ration can be used to boost biogas generation (Bruhn *et al.*, 2010).
- Potential for discussion of reimbursement of nitrogen and phosphorus charges for the municipal sewage treatment plants.

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