# Environmental Impact of Seaweed Cultivation

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# Seaweed cultivation industry



- Rapidly growing aquaculture sector
- Global production 30 milj ton/year
- Wild harvest 1.8 milj ton/year
- Dominated by Asian countries
- Rapidly growing in Scandinavia



Jiaozhou Bay, China.



# Tank and seabased cultivation







# Environmental impact seabased cultivation

#### Proposed effects:

- Decreased light availability leading to decreased primary production
- Change in local hydrodynamics and sedimentation patterns
- Reduced nutrient contents
- Uptake of CO<sub>2</sub>/HCO<sub>3</sub>- (carbon sink?)
- Increased organic matter supply
- Enhance local biodiversity
- No-take zones for fisheries
- Marine pollution





# AquaAgri Kelp

- 4-year project
- upscaling effects
- economical and ecological sustainability



Vouter Visch







### 2 ha test cultivation







### Cultivation in the sea







# Production sugar kelp



Horizontal cultivation: 15 kg per m rep/ 40 ton per ha



*Vertical cultivation (droppers)*: 25 kg per m rep/ 65 ton per ha

- Deployment: September/October
- Harvest: April May
- Optimal cultivation depth: 1 2 m



## Environmental impact





# Methodology

- BACI approach (Underwood 1991, 1992)
- "BACI effect"
- 4 reference sites
- 4 sampling campaigns February and April/May in 2016 and 2017
- Bottom effects the start of the activity considered the "impact"
- Water parameters each cultivation cycle considered the "impact"

BACI (Interaction) Effect = DIFFERENTIAL CHANGE





### Oxygen consumption at the bottom



**Unpublished data** 



# **Bottom fauna**



- van Veen grab
- 65 species

#### **Unpublished data**



# Mobile macrofauna



 6 species (spider crab, swimming crab, shore crab, edible crab, common seastar, shorthorn sculpin)

#### **Unpublished data**



# Conclusions

- Overall minor impact, but increase in some infaunal species
- 2 ha farm is relatively small
- Sustainable production:
  - No fertiliser, pesticide, irrigation
  - Removes nutrients from the sea
  - No competition with arable land



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# Thank You!

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