Blue Carbon and seaweed farms

Progress and plans

06/01/2022

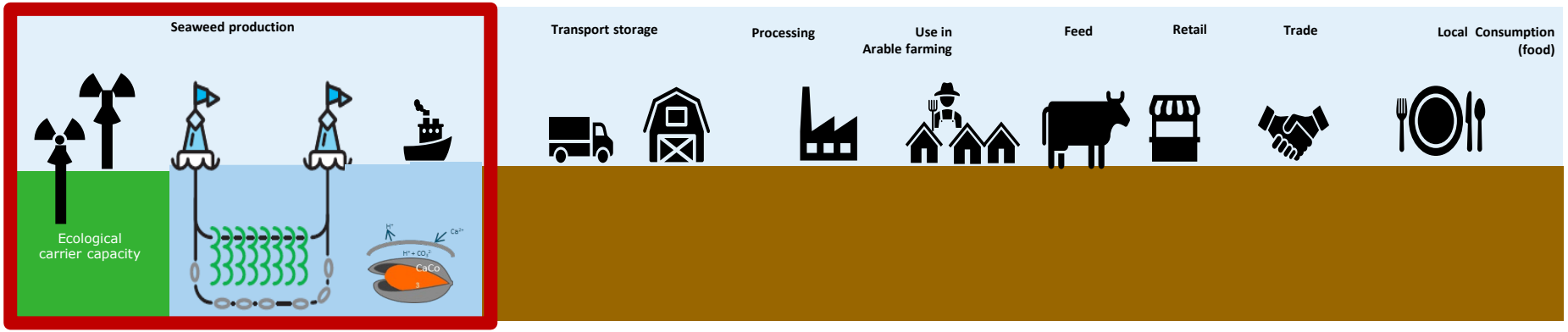
Jeroen Veraart, Arjen de Groot, Edwin Foekema

WAGENINGEN
UNIVERSITY & RESEARCH

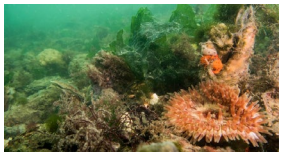
Afbakening en bredere scope KB

Carbon Capture

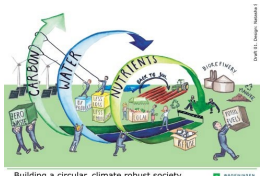
Carbon Footprint, klimaatbeleid →



Context en bredere scope



Biodiversiteit Noordzee



Circulariteit (N, P, biomassa)

Eiwit transitie

WAGENINGEN
UNIVERSITY & RESEARCH

Review workshop (feedback Noordzeeboerderij)

- Zeewierteelt (oogst) dus maar 0,1% van de biomassa als black carbon. Mesocosm experiment: koolstof langdurig vast leggen in de lagere trofische niveaus
- Noordzeeboerderij: Onderzoek haalbaarheid extensieve en diverse ‘kringloop zeebouw’, betekenis voor blue carbon, definieer max SUSTAINABLE Yield;
- Carbon Footprint (opgave = reductie 1,24 megaton CO2 jr-1) door: voedselproductie op zee i.p.v. dierlijk eiwit op land, minder CO2 per liter melk en Blue Carbon. Waar meeste CO2 rendement te halen?
- North sea innovation lab NSIL beschikbaar voor experimenten met een meetboei oceandata, saliniteit, turbiditeit, chlorofyl (aanbod).

Deliverables 2020

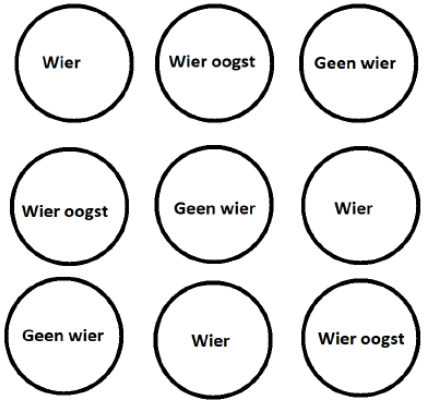
- Rapport Meetmethoden (op KOL)
- Memo mesocosm experiment (July-okt 2020) *(tussenproduct, Edwin Foekema)*
- Review workshopverslag (in ppt vorm) (op KOL)
- Bijdrage aan paper WEcR (draft)

2021

- Vervolg mesocosm experiment (toelichting Arjen)
- Bijdrage aan integraal producr (Jeroen)

Blue carbon mesocosm experiment 2020

Goals:
- Test ability of eDNA screening to detect shifts in plankton communities related to changes in seaweed abundance
- Identify candidate proxies for future carbon flux monitoring

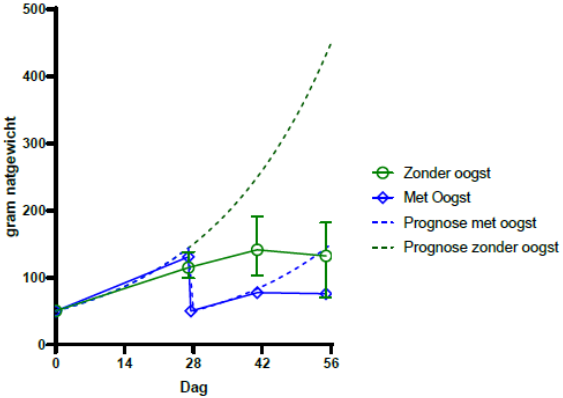


- 10 week experiment from July – October 2020
- 3 treatments x 3 replicate mesocosms
- Periodic measurements of nutrients, Ulva biomass, chlorophyll, turbidity
- Periodic DNA sampling for assessment of phyto- / zooplankton community composition
  → 90 samples processed (DNA extraction, PCR, sequencing)
  → sequencing data arrive by early march 2021

WAGENINGEN
UNIVERSITY & RESEARCH

Blue carbon mesocosm experiment 2020

Ulva biomass

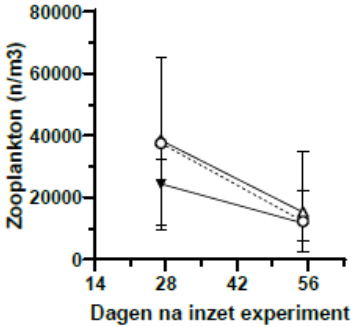


- Development of seeweed and plankton followed expectations until harvest at day 28
- Until then: a bit more phytoplankton in cosms with seeweed, communities controlled by zooplankton

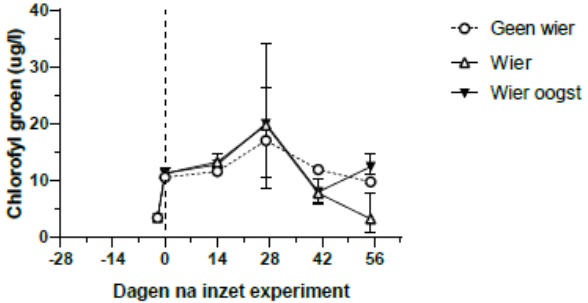
- Harvest coincided with depletion of nutrients in some mesocosms
- Resulting in no clear treatment differences with/without seaweed

→ Report on status so far, and draft SOPs for DNA sampling / processing

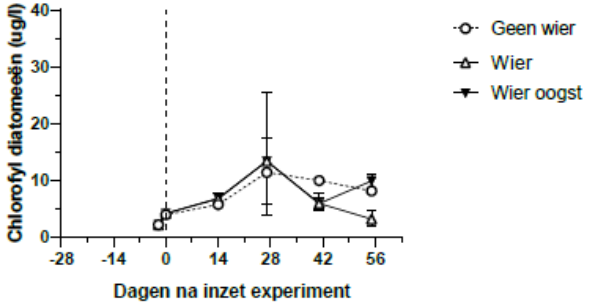
Zooplankton



Chlorofyl green algae



Chlorofyl diatoms



Plans 2021:

1) Bioinformatic processing and ecological interpretation of DNA results (March - May 2021)
   → assess treatment and replicate differences in planktonic community composition
   → identify candidate proxies for carbon flux monitoring
      (e.g. shifts in composition or presence/absence of particular taxa)

2) Finetuning of protocols for DNA-based monitoring sampling and processing, based on results (June 2021)

3) Follow-up experiment (July – Sept 2021)
   → likely again in mesocosms, but now including natural sediment for (gradual) nutrient repletion
   → but ideally now including measurements of carbon fluxes to sediment and/or air
   → potentially requires different mesocosm setup or field setting (to be discussed)

4) Oct-Dec 2021: analysis of DNA samples from follow-up experiment

Vragen?

Jeroen Veraart, Wageningen Ecnvironmental Research

e. jeroen.veraart@wur.nl

t. 0317 484447


Foto: Nathalie Steins

KB-34-007-004

Circulair en klimaatneutraal

Marine resources in circular climate smart food systems

WAGENINGEN
UNIVERSITY & RESEARCH