NBS EduWORLD

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Seaweed Farming Case

Lecture (online)

Learning Unit 40

Credit: Trinity College Dublin

Content created in 2024

Funded by the European Union

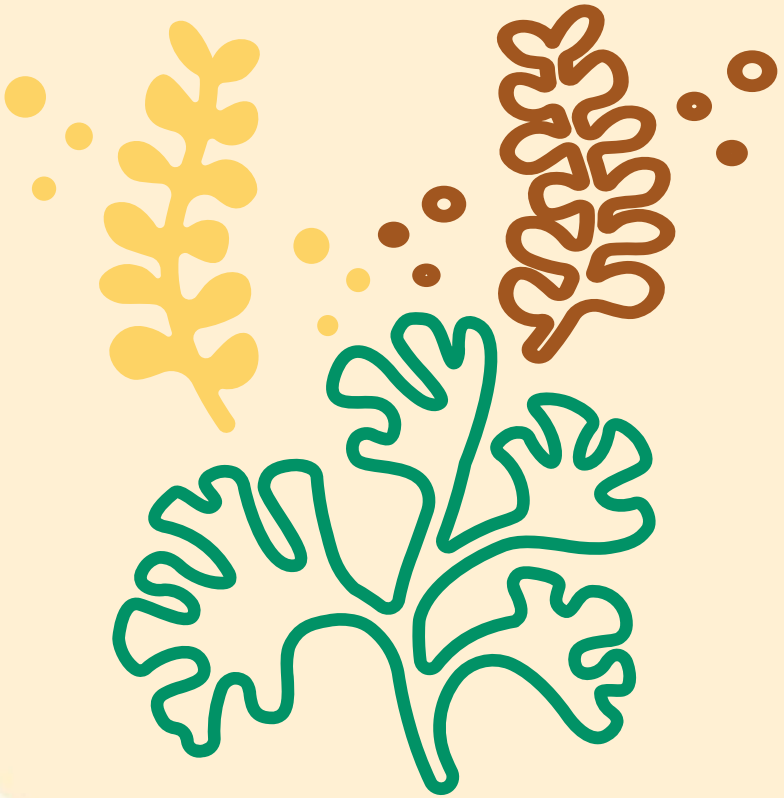
NBS EduWORLD is funded by the European Union (Grant Agreement No. 101060525). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the granting authority can be held responsible for them.

NBS EduWORLD

Introduction

Nature-Based Solutions for Coastal Resilience: Seaweed Farming

- Overview of nature-based solutions (NBS) for coastal and marine environments.
- **Seaweed farming** as a promising NBS for carbon sequestration, coastal protection, and sustainable food production.
- Focus on **EU research projects** exploring seaweed farming for environmental benefits and economic sustainability.



Funded by the European Union

NBS EduWORLD

"Solutions that are **inspired** and **supported** by nature, which are cost-effective, simultaneously provide **environmental, social and economic benefits** and help build **resilience**."

Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions.

European Commission

NBS Definition – EU

Reference: European Commission

What is seaweed farming?

Understanding Seaweed Farming as a Nature-Based Solution

- Seaweed farming involves cultivating edible and non-edible seaweed species in coastal waters.
- Seaweeds help absorb excess carbon dioxide (CO2), improve water quality, and provide habitat for marine biodiversity.
- **Key Benefits**: Carbon sequestration, coastal protection, sustainable resource production.

Funded by the European Union

NBS EduWORLD

EU Research Projects on Seaweed Farming

SEAMARK: uses ground-breaking selective breeding technologies within EU seaweed crop genetics to increase biomass yield.

KELP-EU: aims to jump-start the European sustainable seaweed industry

C-FAARER: supporting the transition towards the use of community-driven sustainable business models

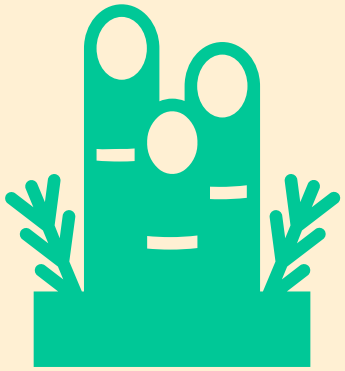
Funded by the European Union

NBS EduWORLD

Why Seaweed?

Benefits of Seaweed Farming for Coastal and Marine Environments

- **Climate Change Mitigation**: Seaweed absorbs CO2 during growth, contributing to carbon sequestration.
- **Coastal Protection**: Seaweed farms reduce wave energy, acting as natural barriers against coastal erosion and storm surges.
- **Biodiversity**: Creates habitats for marine life and helps improve water quality by absorbing excess nutrients.
- **Economic Value**: Seaweed farming supports sustainable industries, such as biofuel, food, and pharmaceuticals.



Funded by the European Union

NBS EduWORLD

Climate Mitigation

Carbon Sequestration Potential of Seaweed Farms

- Seaweed absorbs CO2 from seawater, storing carbon in its biomass.
- Carbon sequestration in seaweed can offset carbon emissions in other sectors.
- Seaweed farms act as a natural solution for mitigating greenhouse gas emissions.
- Example: Ross et al 2023

Funded by the European Union

1. Site Selection

Identify Suitable coastal areas with favorable conditions:

5-20 degrees Celsius

10-30meters deep

Moderate currents

30-35 PSU (practical salinity units)

Moderate Wave Action

2. Permit and regulatory approval

secure the necessary permits and approvals from local and national authorities

3. Species Selection

Choose the appropriate seaweed species (kelp or algae etc.) based on local conditions

4. Farm Design

Design the farm layout eg floating or anchored systems, cultivation lines etc

5. Harvesting and processing

Develop methods for harvesting, processing and marketing the seaweed products

Funded by the European Union

NBS EduWORLD

Highlight: Site Selection and Planning

Choosing the Right Location for a Seaweed Farm

- **Environmental Considerations**: Ensure minimal disruption to local ecosystems, navigation routes, and fisheries.
- **Water Conditions**: Select areas with optimal temperature, salinity, and current for the chosen seaweed species.
- **Accessibility**: Location must be accessible for farm maintenance, harvesting, and transport.
- **Regulatory Compliance**: Ensure compliance with maritime and environmental regulations. Check with the relevant maritime regulatory body in your county.

Funded by the European Union

NBS EduWORLD

Highlight: Site Selection and Planning

Designing a Sustainable Seaweed Farm

- **Floating Systems**: Using floating platforms or rafts to suspend seaweed in the water column.
- **Anchored Systems**: Lines anchored to the seafloor for larger-scale operations.
- **Sustainability Considerations**: Design systems that minimize environmental impact and ensure ease of maintenance and harvesting.

Funded by the European Union

NBS EduWORLD

Seaweed Species for Farming

Choosing the Right Seaweed Species for Farming

- **Edible Seaweeds**: Kelp, nori, wakame, and other edible algae used in food, medicine, and cosmetics.
- **Industrial Seaweeds**: Seaweeds used for biofuels, bioplastics, and pharmaceuticals.
- **Eco-Engineering**: Use of native species for coastal protection and restoration.

Funded by the European Union

Farming Techniques

Best Practices for Seaweed Cultivation

- **Seeding**: Attach seaweed spores to ropes or other substrates to allow growth.
- **Growth Monitoring**: Regularly monitor growth rates and environmental conditions (e.g., water quality, temperature).
- **Harvesting**: Once seaweed reaches maturity, harvest using manual or mechanical methods.
- **Sustainability**: Employ environmentally friendly methods to minimize damage to ecosystems and ensure farm sustainability.

Funded by the European Union

Funding Models for Seaweed Farming

Financial Support and Investment in Seaweed Farming

- **EU Funding**: EU provides funding through various programs like **Horizon 2020**, **Interreg**, and **Blue Growth** to support sustainable marine projects.
- **Public-Private Partnerships**: Collaborative funding models between governments, research institutions, and private investors.
- **Grants and Subsidies**: Local and international funding sources dedicated to green, sustainable agriculture.
- **Social Enterprises**: Community-based funding for seaweed farms that emphasize local economic benefits and environmental sustainability.

Funded by the European Union

NBS EduWORLD

Examples

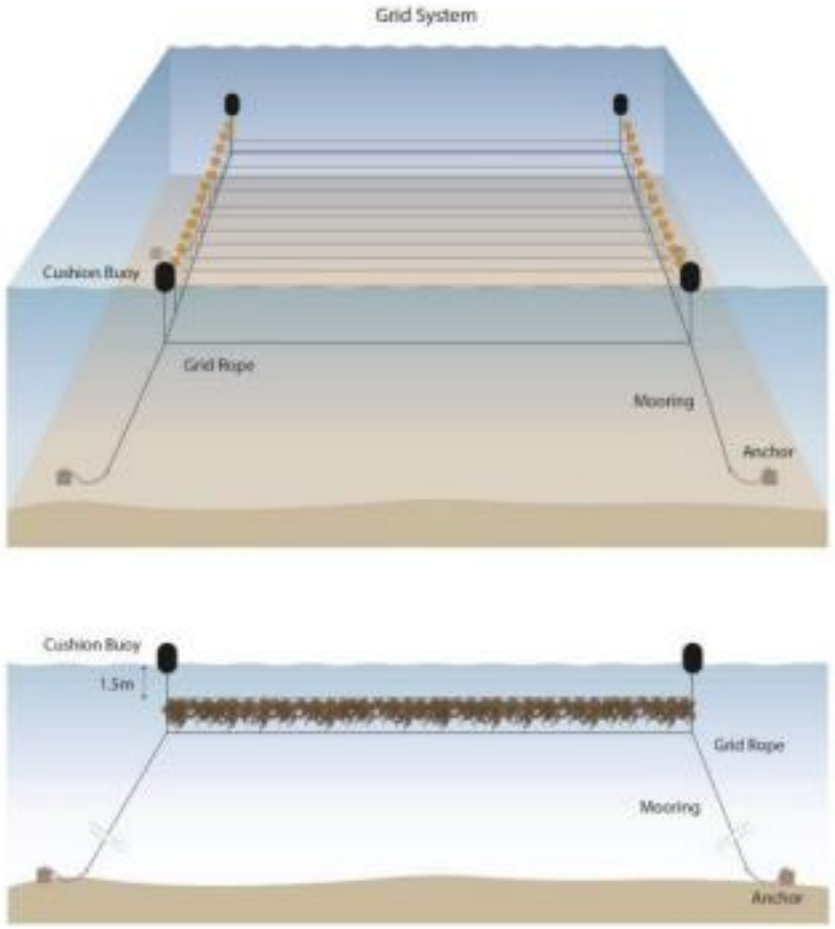


Figure 1. Double header system and grid-based longline system

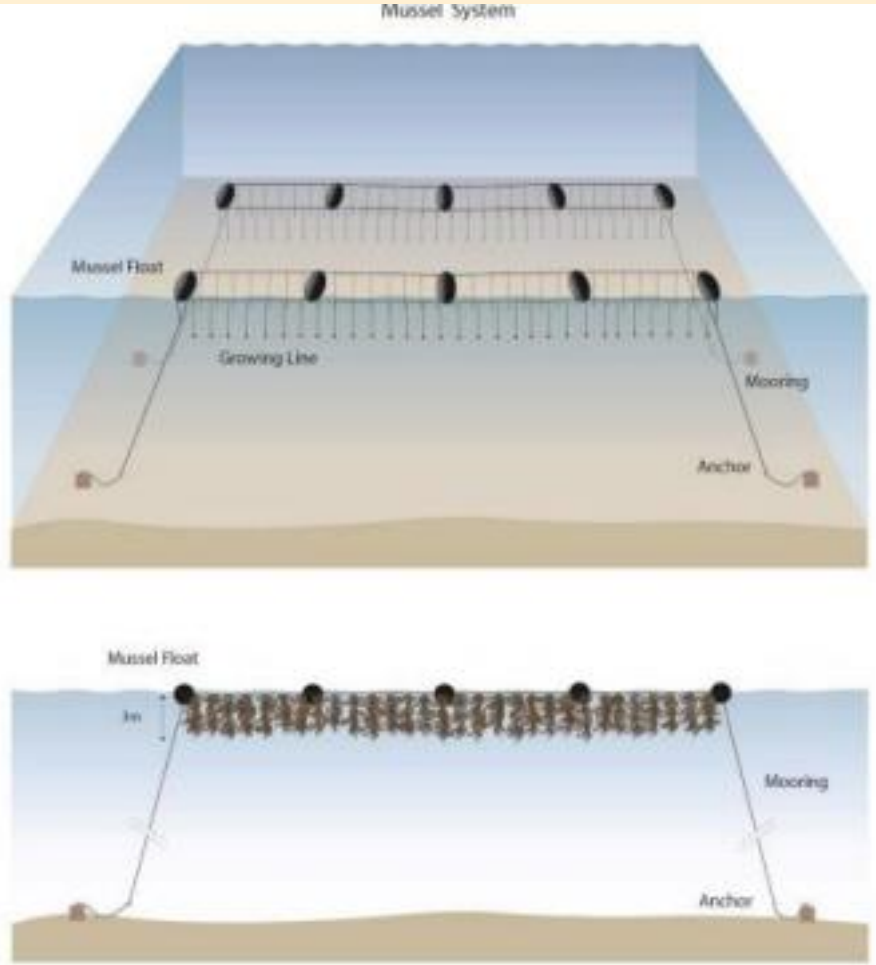
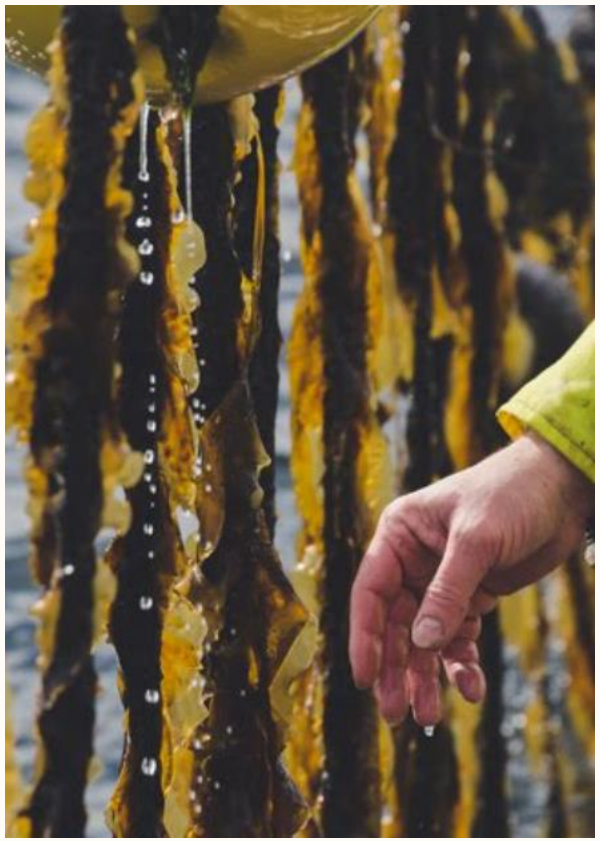


Figure 2. Pair of double-header rope mussel systems used for seaweed cultivation.

Funded by the European Union

NBS EduWORLD

Market Opportunities



Economic Potential of Seaweed Farming

- **Food Industry**: Seaweed as a sustainable food source for human consumption (e.g., snacks, salads, and health supplements).
- **Bioenergy**: Seaweed can be used to produce biofuels, reducing reliance on fossil fuels.
- **Pharmaceuticals and Cosmetics**: Seaweed extracts are used in skincare and medicinal products.
- **Carbon Credits**: Seaweed farms could earn carbon credits for their sequestration efforts, adding to economic viability.

Funded by the European Union

NBS EduWORLD

Challenges in Seaweed Farming

Obstacles to Scaling Up Seaweed Farming

- **Regulatory Hurdles**: Navigating legal and regulatory frameworks for marine farming.
- **Environmental Conditions**: Variability in water temperature, salinity, and currents that can impact seaweed growth.
- **Market Demand**: Establishing stable and diverse markets for seaweed products.
- **Technical Expertise**: Need for skilled labour and advanced technology for farming and harvesting.

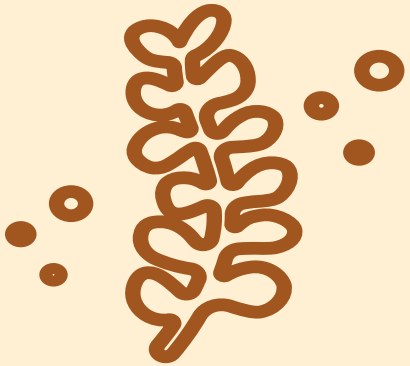
Funded by the European Union

NBS EduWORLD

Monitoring and Maintenance

Best Practices for Seaweed Farm Monitoring

- **Regular Environmental Monitoring**: Measure water quality (e.g., temperature, salinity) and farm conditions to optimize growth.
- **Harvesting Schedules**: Monitor growth rates to ensure timely and efficient harvesting.
- **Post-Harvest Handling**: Proper handling and processing of harvested seaweed to prevent degradation and ensure quality.



Funded by the European Union

Long Term Sustainability

Ensuring Long-Term Success of Seaweed Farms

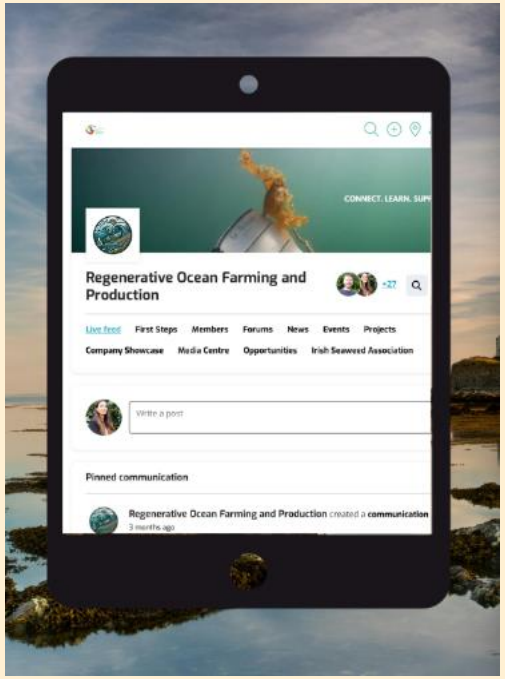
- **Adaptive Management**: Regularly adapt farm practices based on environmental changes and market trends.
- **Eco-friendly Practices**: Use non-invasive species, and reduce waste during processing to protect marine environments.
- **Monitoring Carbon Sequestration**: Measure the amount of CO2 sequestered by seaweed farms for continuous improvement and verification.

Funded by the European Union

Conclusion

Seaweed Farming: A Promising Solution for a Sustainable Future

- Seaweed farming offers numerous **environmental and economic benefits** as a nature-based solution.
- **EU projects** demonstrate the potential of seaweed farming for climate change mitigation, coastal protection, and sustainable economies.
- Proper **implementation, monitoring, and collaboration** can ensure seaweed farming's success in combating climate change.



Funded by the European Union

NBS EduWORLD

Funded by the European Union

NBS EduWORLD is funded by the European Union (Grant Agreement No. 101060525). Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Commission. Neither the European Union nor the granting authority can be held responsible for them.

Thank you!

Credit for this content:

Centre for Social Innovation, Trinity College Dublin

Learn more:

https://nbseduworld.eu

info@nbseduworld.eu

NBS EduWORLD

@NBS_EduWORLD

NBS EDUWORLD