

# Community Seagardens in Germany

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Concept and Scenario



Presentation by Tineke Heidebrecht for CRM

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# Community Seagardens

- Line systems deployed at platforms or other devices where algae (and mussel) grow
- Regenerative: no additional inputs, only use of sea environment
- Community: non-profit, communally organised with members who are jointly responsible for cultivation and get to keep the harvest
- Germany can learn from Denmark where seagardens are already established



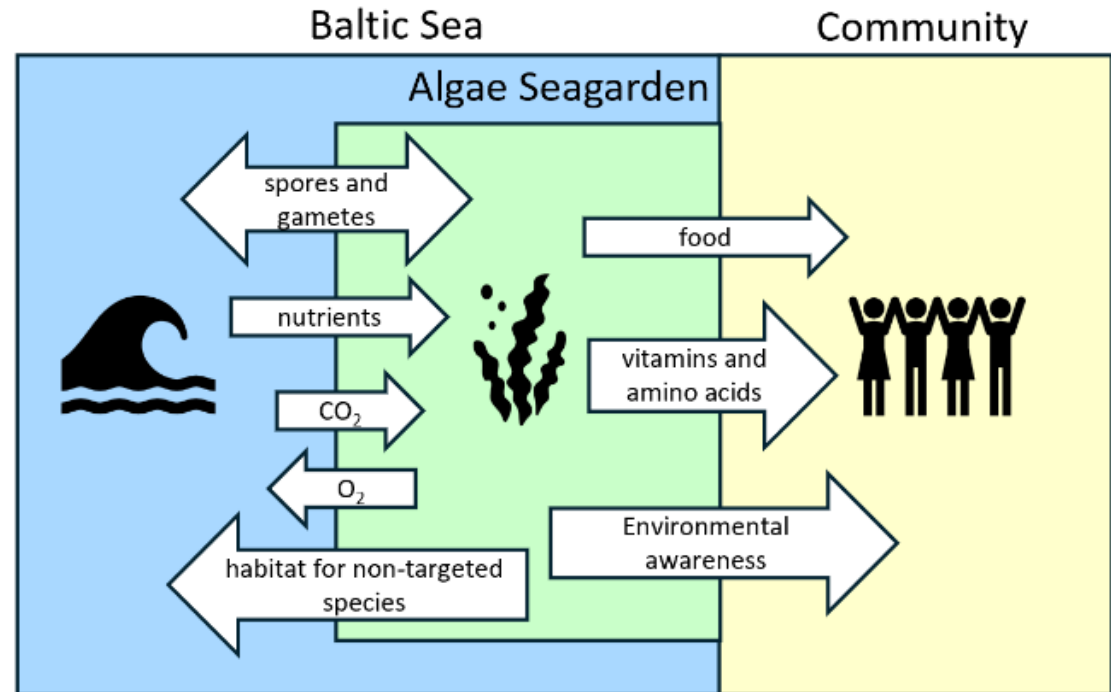
# Benefits from Community Seagardens

## Marine Environment:

- Algae take up excess nutrients
- Algae take up CO<sub>2</sub> and produce O<sub>2</sub>
- Algae provide habitat for other species
- Can contribute to renaturation of threatened species

## Community:

- Healthy nutrition: food source with many vitamins and vital amino acids
- Creates environmental awareness and stewardship



# Core Design Principles

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SG2 MS8: Strategy developed containing propositions of combining renaturation and utilization

# Core Design Principles: Combining Renaturation and Utilization I



## Restoration of native species

- Planting threatened species (e.g. *Fucus vesiculosus* or *Fucus serratus*)
- Using seagardens as stepping stone habitats to support ecological restoration



## Little disruption during vulnerable periods

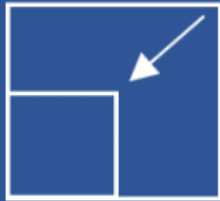
- Avoid intensive or disruptive activities during sensitive periods for algae and associated marine organisms



## No invasive species

- Do not cultivate non-native species to prevent possible negative impacts on native environment

# Core Design Principles: Combining Renaturation and Utilization II



## Moderate cultivation area

- Keep seagarden area small to reduce ecological risks and to minimize social conflict potential
- Explore multi-use facilities (e.g. algae cultivation in marinas during winter)



## Monitoring

- Regular assessment of water quality, algae condition and associated marine organisms
- Early detection of undesirable developments
- Generating knowledge to improve cultivation practices

# Core Design Principles: Community Integration



## Transparency and Accessibility

- Outreach, education and transparency to ensure long-term support from the local community
- Visibility and information in public spaces
- Public education on algae for nutritional purposes



## Partnerships

- Collaboration with schools to use seagarden as a site for environmental education
- Integration into local institutional and community structures

# Planning and Operational Considerations for Community Seagardens in Germany

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SG2 MS9: Germany adapted seaweed garden concept

# Site Selection & Properties

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Suitable sites...

...are protected from heavy winds and weather

... have a minimum depth of 5-10 meters (line systems) or a depth of up to 2 meters (stone systems)

... have gravel, sand or mud substrate (line systems) or hardsubstrate (stone systems)

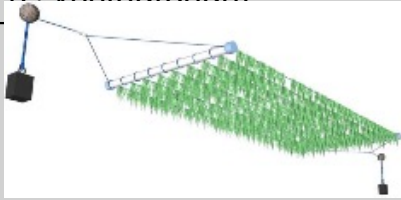
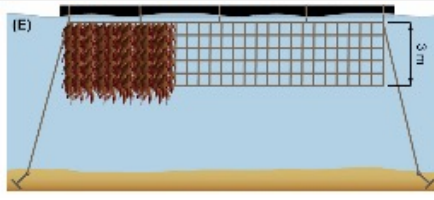

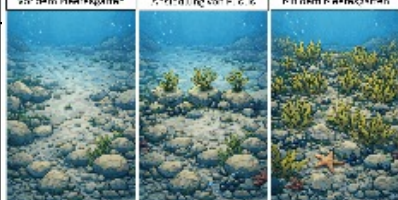
... have moderate current for nutrient input and output

... have a minimum water clarity of 1-2 meters

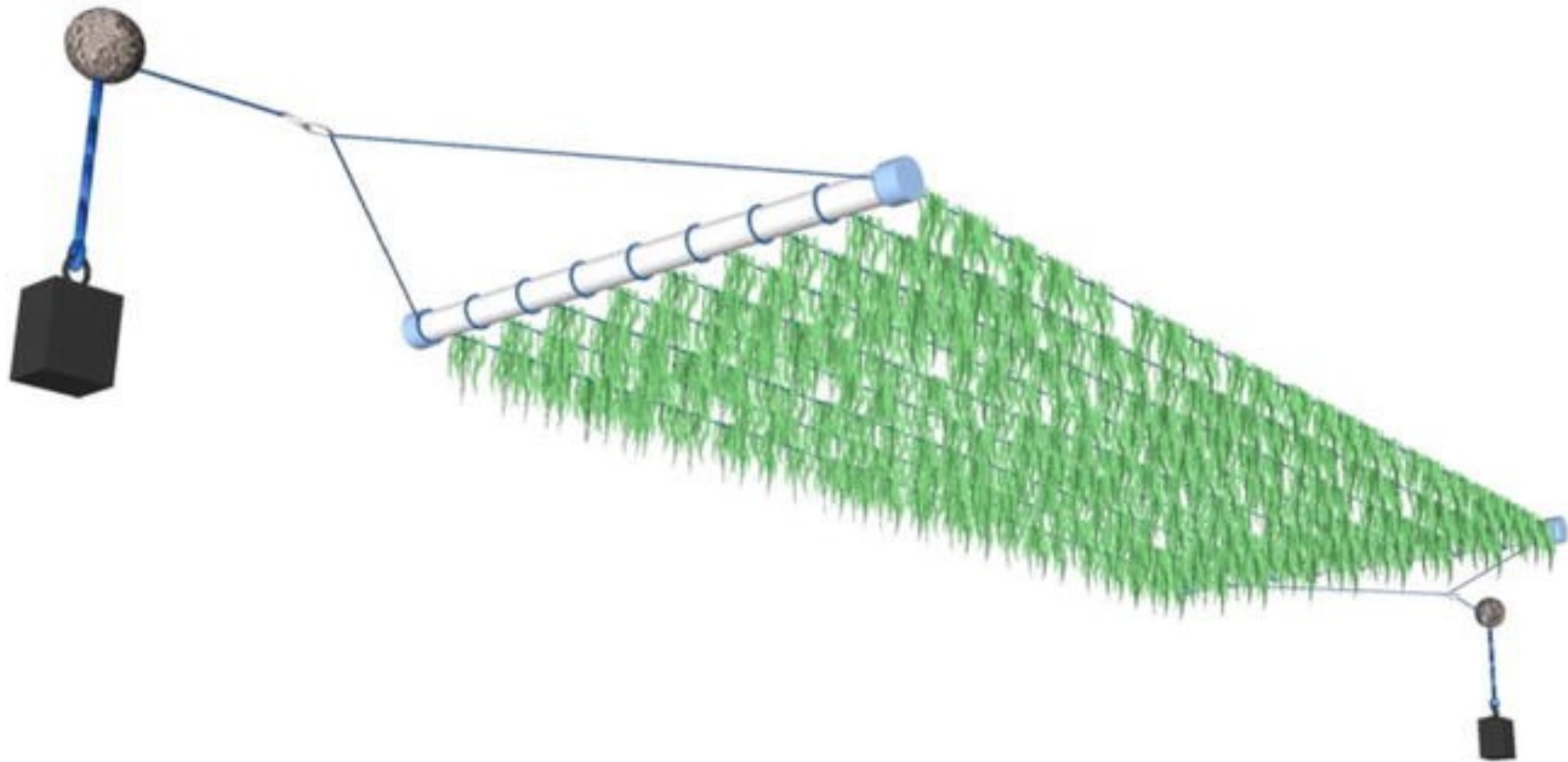
... have temperature, salinity and depth conditions under which the chosen algae perform well

Name	Latin name	Salinity	Temperature	Depth
<b>Sugar kelp</b>	<i>Saccharina latissima</i>	16 – 35 psu	3 – 17 °C	1 – 8 m
<b>Bladderwrack</b>	<i>Fucus vesiculosus</i>	18 – 35 psu	4 – 20 °C	0 – 3 m
<b>Sea lettuce</b>	<i>Ulva lactuca</i>	8 – 30 psu	10 – 20 °C	1 – 3 m
<b>Serrated wrack</b>	<i>Fucus serratus</i>	18 – 35 psu	0 – 20 °C	0 – 4 m

# Cultivation Systems

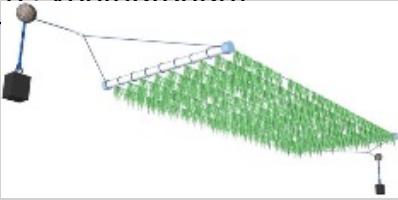
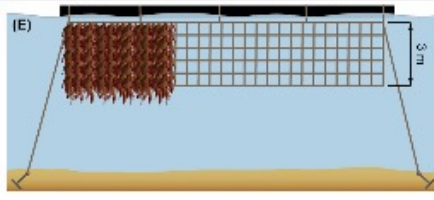

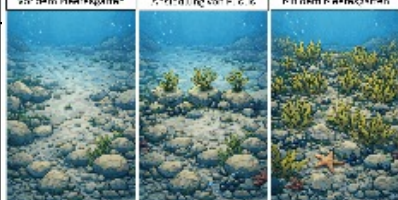
	Line Systems	Net systems	Cage systems	Stones
Seeding	Sporelines	Sporelines	Thalli (= pieces of algae) are placed in the cages	<ol style="list-style-type: none"> <li>1. Stones are placed near populations or artificially fertilized</li> <li>2. Initial stones are placed in the seagarden</li> </ol>
Process	Algae grow on horizontal or vertical lines that are held by buoys which are anchored in the seafloor	Set-up is similar to line systems but instead on vertical/horizontal lines, the algae grow on a vertical net	Algae grow in permeable cages to protect algae from tear, grazing and drifting	Algae grow on the initial stones and naturally spread to adjacent suitable habitat
Suitable species	<i>S. latissima</i> <i>U. lactuca</i> ( <i>F. vesiculosus</i> )	<i>S. latissima</i> <i>U. lactuca</i>	<i>F. vesiculosus</i> <i>F. serratus</i>	<i>F. vesiculosus</i> <i>F. serratus</i>
Visualization				

# Line System Sketch

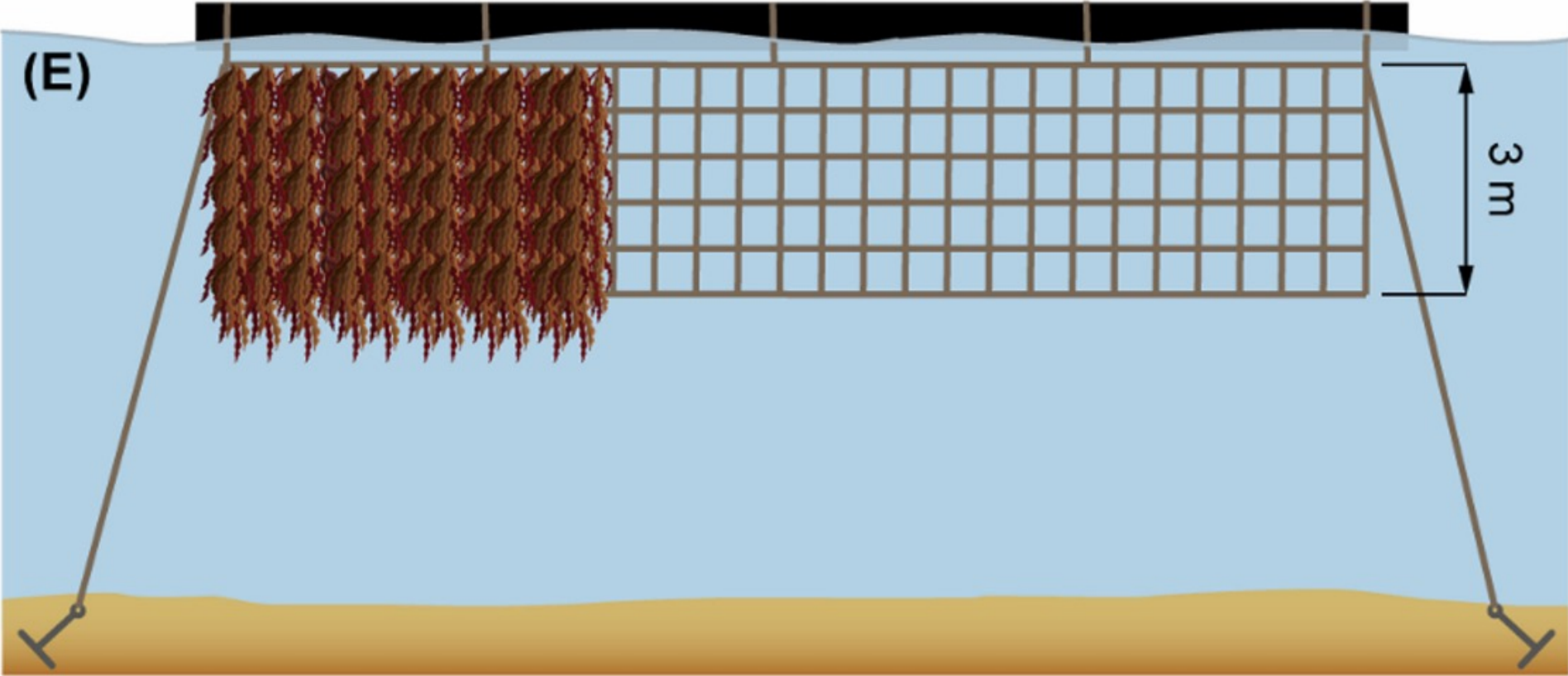


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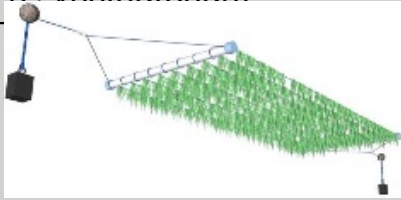
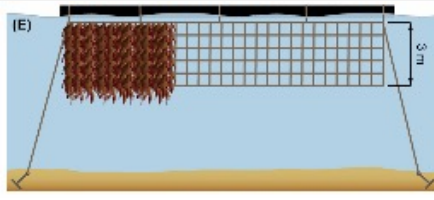

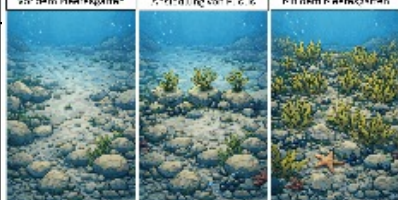
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# Net System Sketch



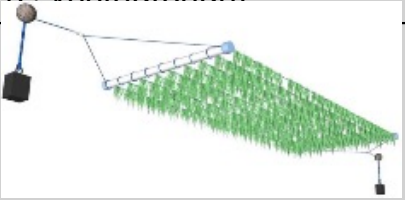
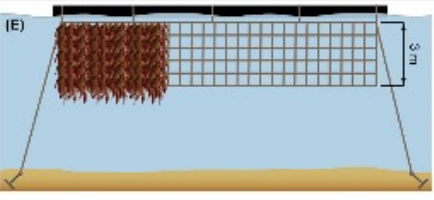

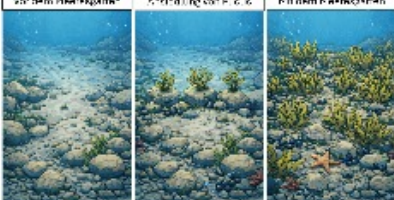
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Visualization				

# Cage System Sketch



# Cultivation Systems

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Visualization				

# Stone System Sketch

No seagarden, *Fucus*  
sparse



*Fucus* settling on new  
stones



Seagarden with dense  
*Fucus*



# Permission Process

No official permission by government authorities necessary if the community seagarden is...

... non-commercial

... small-scale

...reversible

... without any built structure on land



Property owner's consent is sufficient



*The Permitting Guideline for the Development and Promotion of Sustainable Aquaculture in Schleswig-Holstein (Baltic coastal waters)* provides an overview of the required approvals, including water law authorization, nature conservation permits, electricity and navigation safety approvals, and additional permits such as building permits

# Managing Costs

- Community seagardens are non-profit and small scale for own use
- Costs can be structured into:
  - Initial costs (1.000 – 3.200 €)
  - Recurring costs (350 – 2.000 € / year)
  - Revenue streams (900 – 2.200 € / year)
- External funding can help setting up a seagarden. Possible funding includes:
  - City
  - Federal
  - National
  - EU
  - Private

Costs	Preis
<b>Initial costs</b>	<b>1.000 – 3.200 €</b>
Infrastructure and materials (ropes, buoys, anchoring weights, information boards, carabiners; cages if required)	500 – 1.500 €
Seeding material and preparation (seed lines, preparation of <i>Fucus</i> stones, laboratory costs if applicable)	200 – 800 €
Monitoring, documentation and harvesting equipment (measuring devices, gloves, waders and snorkeling masks; harvesting containers such as buckets, tubs, crates)	300 – 900 €
<b>Recurring costs / year</b>	<b>350 – 2.000 €</b>
Lease / site rental	0 – 500 €
Laboratory costs	0 – 500 €
Insurance	100 – 300 €
Replacement materials (waders, lines, etc.)	150 – 400 €
Storage	100 – 300 €
<b>Revenue streams / year</b>	<b>900 – 2.200 €</b>
Membership fees	600 – 1.000 €
Fees from environmental education events	300 – 1.200 €
Grants / Funding	?

# Scenario: The Kiel Meeresgarten

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SG2 MS10: Realistic and concrete scenario for growing, harvesting and use of algae described



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## Central aspects:

- *Fucus* cultivation
- *S. latissima* cultivation
- Environmental education
- Location
- Partnerships



***Fucus* cultivation**

**Cultivation method:** Stone cultivation

**Seeding:** stones placed in adjacent populations

**Maintenance:** population reinforcement and light control

**Harvest:** in waders by hand

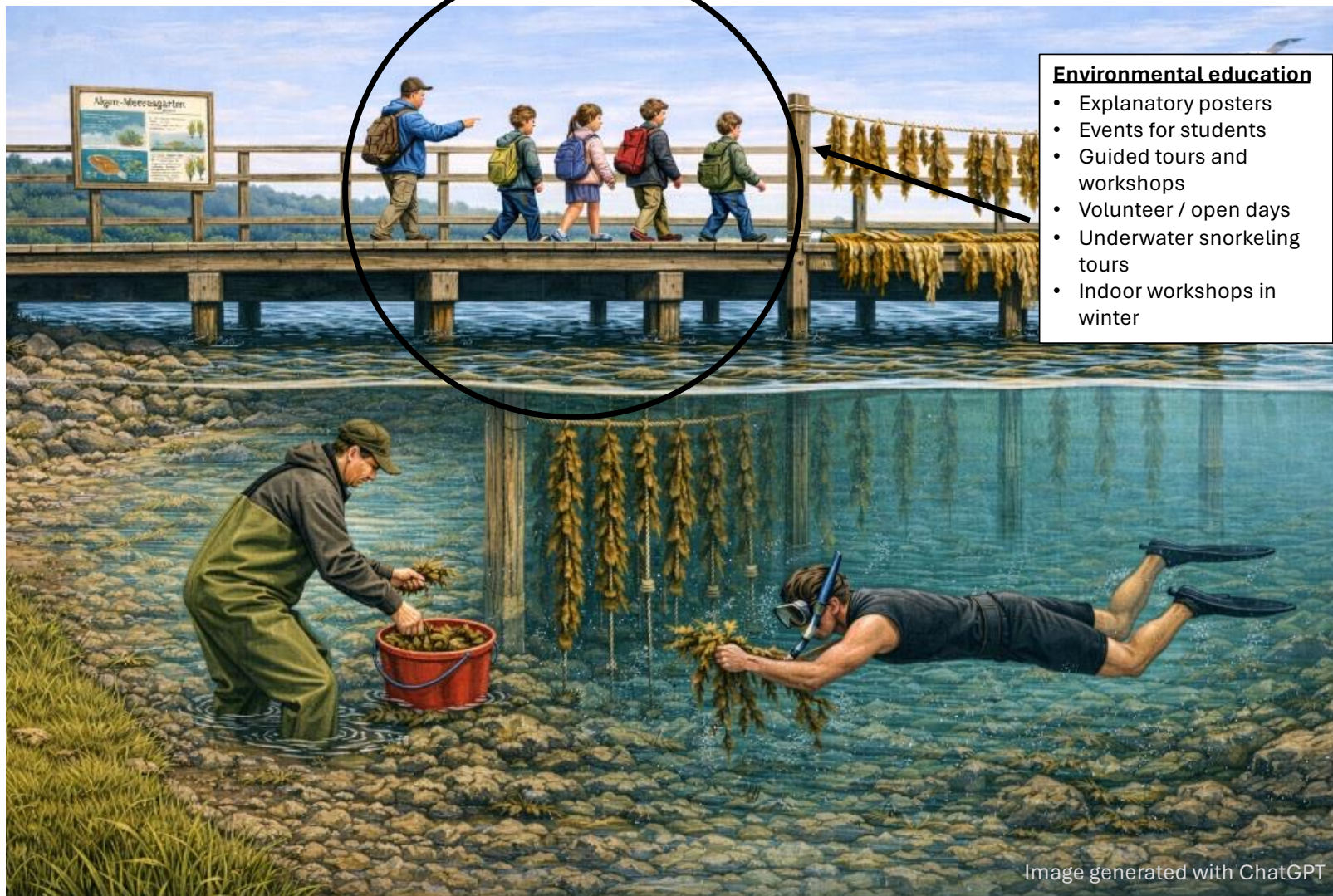
**Use:** fresh, dried or smoked for own use in kitchen

Image generated with ChatGPT



***S. latissima* cultivation:**  
**Cultivation method:** longlines  
**Seeding:** seeding lines  
**Maintenance:** structural checks and biofouling control  
**Harvest:** by hand, snorkeling  
**Use:** fresh or dried for own use in kitchen

Image generated with ChatGPT



- Environmental education**
- Explanatory posters
  - Events for students
  - Guided tours and workshops
  - Volunteer / open days
  - Underwater snorkeling tours
  - Indoor workshops in winter

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# Scenario: Location and Partnerships

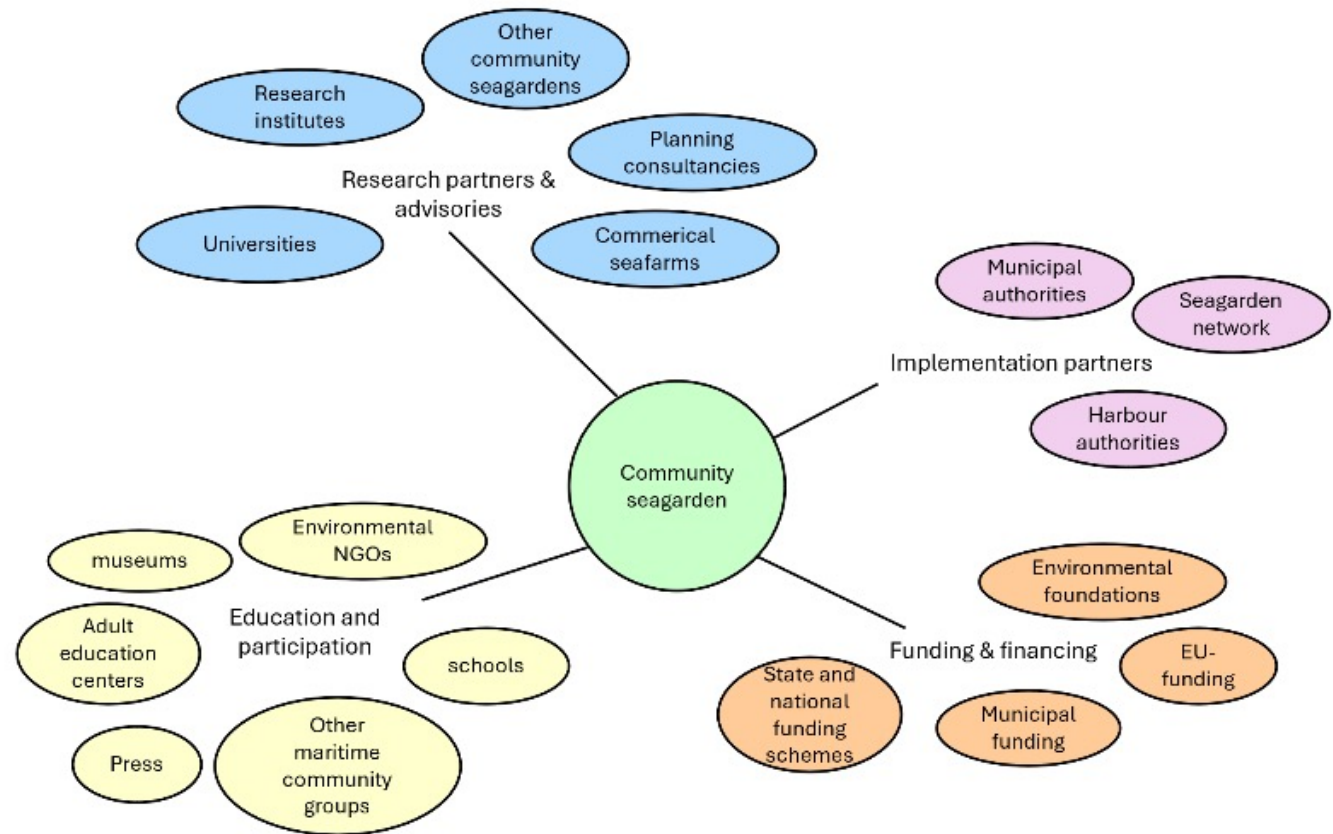
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Suitable locations for seagardens:

- Piers and platforms that are rarely used or seasonally used
- sheltered

→ Marinas and recreational harbours

→ Bathing piers





# Conclusion

- Algae farming bears a great potential for healthy nutrition, sustainable aquaculture and renaturation at the same time
- Community seagardens can facilitate environmental stewardship
- Implementation in Germany is feasible: many suitable small sites (bathing piers, marinas), moderate pilot-scale costs, and manageable permitting if projects are small, reversible, and attached to existing infrastructure
- While *Saccharina latissima* is well established in aquaculture, cultivation of native Baltic species (*Fucus vesiculosus*, *F. serratus*) may provide stronger restoration benefits
- Kiel is a promising pilot location, following the Flensburg seagarden project, due to its “Meeresschutzstadt” [Marine protection city] strategy, research institutions (e.g. GEOMAR, CAU), and active coastal communities
- Partnerships and networks with existing German and Danish seagarden initiatives are key to knowledge transfer, permitting experience and long-term success

# Thank you for your attention!

Feel free to ask questions



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