

Perceptions of Seaweed Aquaculture in Santa Barbara and Ventura Counties

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Client: Ocean Rainforest, Inc.

Environmental Problem

Economic, regulatory, and social constraints have played a role in preventing seaweed aquaculture from being widely implemented in the United States. Industry development is, in part, dependent on rectifying the public's misconceptions and improving monitoring and data collection of the growing blue economy to ensure sustainability and gain social acceptance.



Significance

Seaweed aquaculture is an environmentally responsible and sustainable form of biomass production. It provides a source of biomass for food,¹ raw materials,¹ and biofuel,² as well as, a range of potential ecosystem services including short-term carbon sequestration,^{3,4} nutrient mitigation,^{3,5} coastal protection,⁶ and habitat⁷ for a diverse range of species.

In 2021, NOAA released the Atlas of Aquaculture Opportunity Areas (AOAs), which identified 500 to 2,000-acre areas with suitable conditions for offshore aquaculture that minimized spatial conflicts with other users. Of the ten locations identified in the Southern California Bight, eight are located in the Santa Barbara Channel.

Project Objectives

1

Identify stakeholder perceptions of seaweed aquaculture in Santa Barbara and Ventura counties

2

Evaluate the influence of stakeholder perceptions on seaweed aquaculture development

3

Examine whether seaweed aquaculture has a social license to operate in Southern California

Approach



Stakeholder Identification

- Stakeholders were identified through a literature review, a mapping exercise with Ocean Rainforest, and snowball sampling.

Data Collection

- A survey of the general population of Santa Barbara and Ventura counties was used to assess residents' support, familiarity, and knowledge of seaweed aquaculture.
- Semi-structured interviews were used to gather information from experts in different stakeholder groups and understand their perceptions of the aquaculture industry.



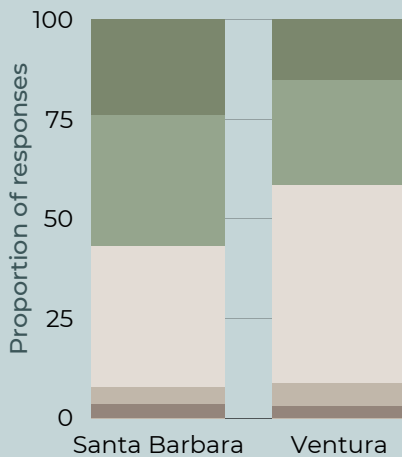
Communication Strategy

- Results from the survey and semi-structured interviews will be used to engage with the community and communicate Ocean Rainforest's mission to expand commercial seaweed aquaculture in the United States.

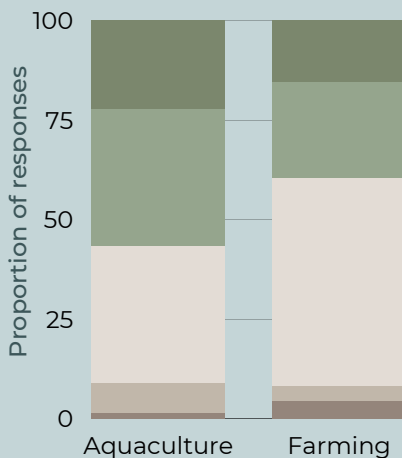


Key Findings

Aquaculture Support

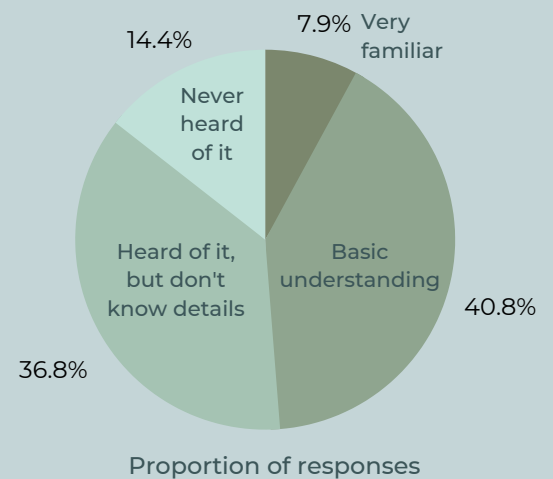


A majority (56.8%) of Santa Barbara and Ventura County residents support expanding seaweed aquaculture in the Santa Barbara Channel. Despite opposition to recent aquaculture proposals in the region, very few (8.8%) residents are opposed to expanding seaweed aquaculture.



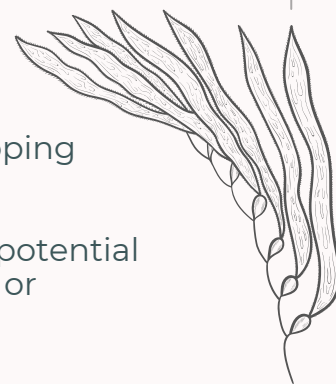
Terminology influences support. Respondents are more likely to have favorable impressions of kelp or seaweed *aquaculture* than of kelp or seaweed *farming*.

Aquaculture Knowledge



Most respondents (77.6%) had heard of or had a basic understanding of aquaculture, but when asked about the economic and environmental impacts of kelp aquaculture, ~25% of residents responded 'don't know' reflecting a deeper unfamiliarity with the tradeoffs of expanding the industry. Despite this lack of knowledge, a majority (58.8%) of residents agreed that kelp aquaculture could have a positive impact on the local economy.

Impacts



- 1 Identified sources of stakeholder resistance**

Stakeholder resistance has been cited as a major barrier to developing offshore facilities in the United States.

Stakeholder concerns in the Santa Barbara Channel focus on the potential economic impacts to fishing communities and the lack of trust in or accountability of the industry.
- 2 Highlighted opportunities to build community familiarity with the industry**

Seaweed aquaculture can advance more rapidly if members of the public and individuals entering the industry have greater access to information.

Seaweed aquaculture companies should develop an engaging communication strategy to provide information to the local community. This increases the likelihood that individuals without previous knowledge or opinions will develop more positive perceptions of the industry.
- 3 Developed a foundation and framework for future aquaculture social licensing campaigns in the United States**

Safe and sustainable aquaculture is dependent on ensuring that environmental standards are met through the permitting process and associated monitoring requirements.

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1. MacArtain, P. *et al.* Nutritional value of edible seaweeds. *Nutr. Rev.* 65, 535–543 (2007).
2. Roesijadi, G. *et al.* Macroalgae as a Biomass Feedstock: A Preliminary Analysis. *U.S. DOE* (2010).
3. Duarte, C. M. *et al.* Can Seaweed Farming Play a Role in Climate Change Mitigation and Adaptation? *Front. Mar. Sci.* 4, (2017).
4. Krause-Jensen, D. & Duarte, C. M. Substantial role of macroalgae in marine carbon sequestration. *Nat. Geosci.* 9, 737–742 (2016).
5. Racine, P. *et al.* A case for seaweed aquaculture inclusion in U.S. nutrient pollution management. *Mar. Policy* 129, 104506 (2021).
6. Jackson, G. A. & Winant, C. D. Effect of a kelp forest on coastal currents. *Cont. Shelf Res.* 2, 75–80 (1983).
7. Campbell, I. *et al.* The Environmental Risks Associated With the Development of Seaweed Farming in Europe - Prioritizing Key Knowledge Gaps. *Front. Mar. Sci.* 6, (2019).