



New and Emerging Global Seaweed Markets Report 2023

An analysis of new and emerging market opportunities

Outline

Background

Technical justification

Methodology

Key findings

Seaweed supply

Potential markets

Global seaweed opportunities

New and emerging markets

Conclusions

Objective of the report

Analysis of new markets for seaweed-based products matched with an assessment of the current state of the global seaweed production

Background

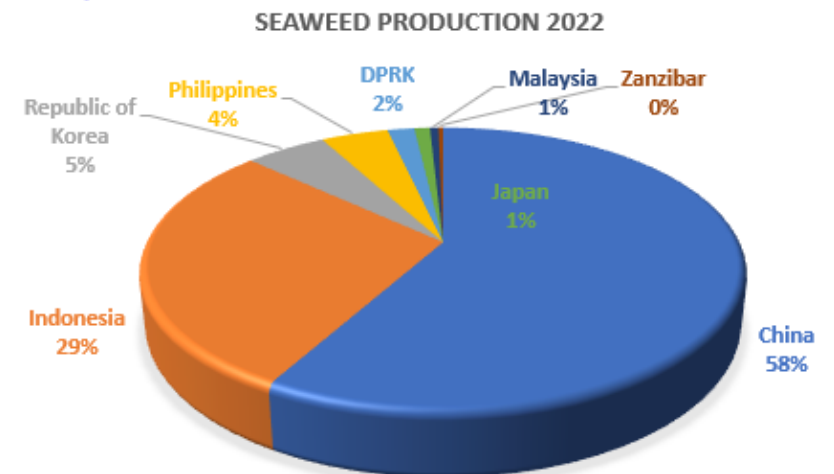
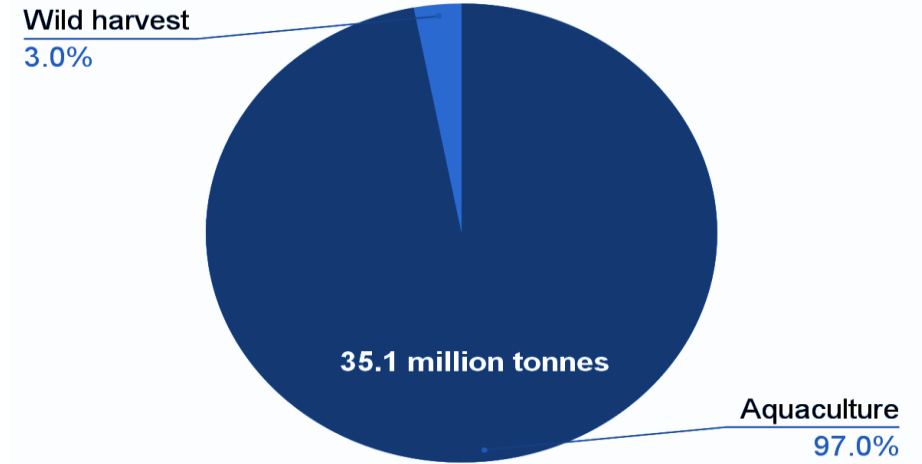
Sustainable long-term seaweed production and investments have been limited by key bottlenecks:

- Limited production outside Asia region
- Raw material availability
- Quality consistency
- Limited analytical data
- Inexistent or limited regulatory frameworks

Macroalgae provide a range of ecosystem services – to be commercialized or leveraged:

- Biodiversity, blue and carbon credits
- Bioremediation
- Biodiversity enhancement
- Habitat restoration

Asia 97% global production



Methodology



1. Identification of relevant industry stakeholders: 133 interviews conducted covering 300 sources



3. Market forecast exercise for targeted applications



2. Deep dive into selected seaweed application areas: 11 new and emergent areas were selected



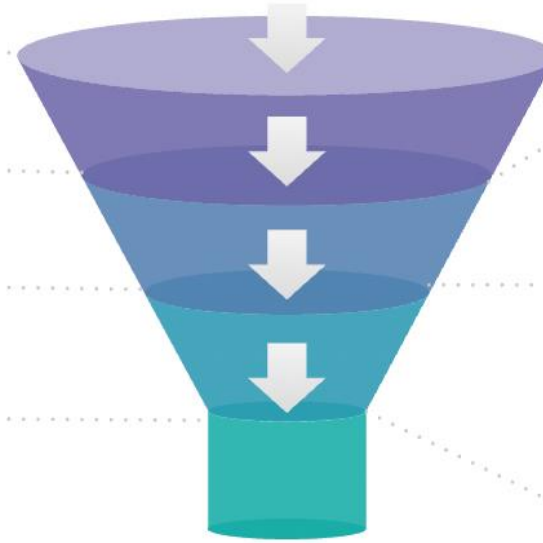
4. Identification major limitations and gaps within the study

We took **±120 applications** of seaweed

Ran a **prioritization screen** to find our shortlist

Decided on **10 sectors** for further evaluation

That we will use to develop the **Global Seaweed Report**



Based on:

- Market Growth Data
- Environmental impact
- Socio-economic impact
- Expert input

Including:

- Animal Feed
- Methane Reducing Feed Additives
- Alternative Proteins
- Biostimulants
- Bioplastics
- Fabric
- Construction
- Nutraceuticals
- Pharmaceutical

- Ecosystem Services

Using:

- Market data
- Grey literature
- Scientific literature
- Stakeholder interviews with:
 - Innovators
 - Corporations
 - Experts

SELECTION OF NEW AND EMERGENT APPLICATIONS

Methodology: focused on 5 major seaweed species

Seaweed production growth by volume and species 2000-2020 production in volume (wet weight)

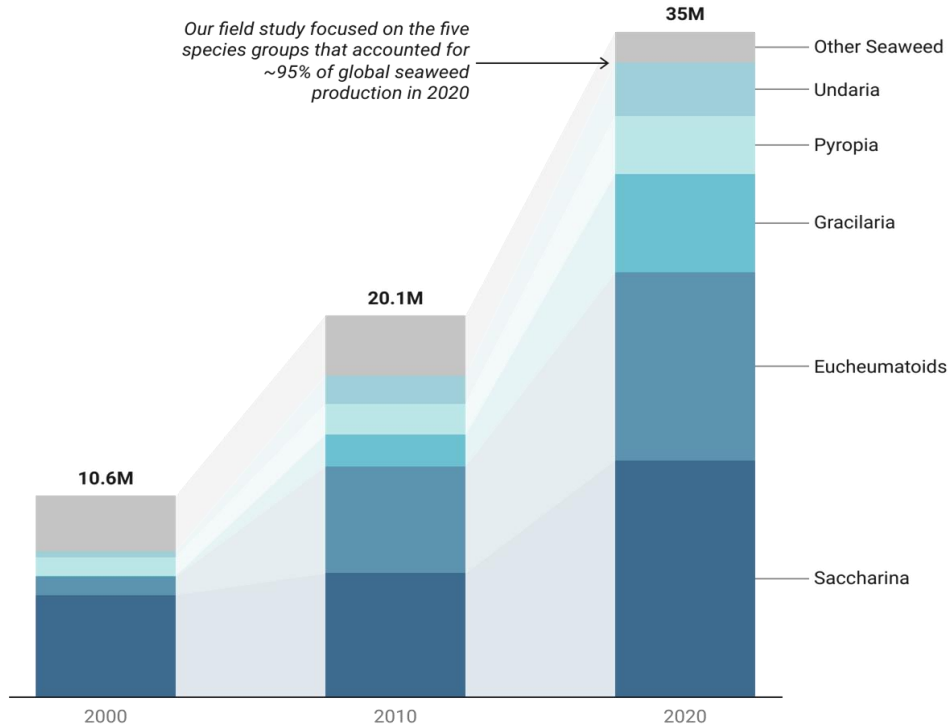
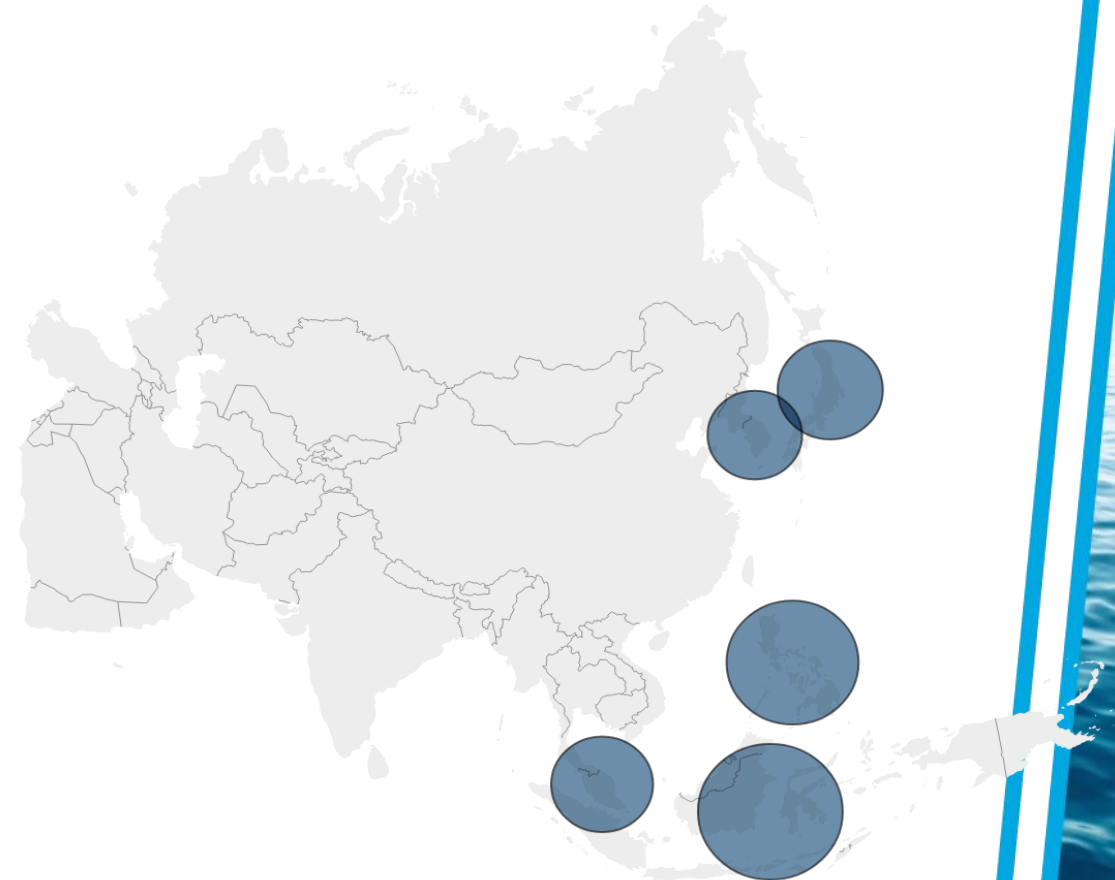


Chart: Hatch Innovation Services • Source: FAO Fisheries and Aquaculture • Created with Datawrapper

95% of global seaweed production

Countries covered by the study





Limitations of the study

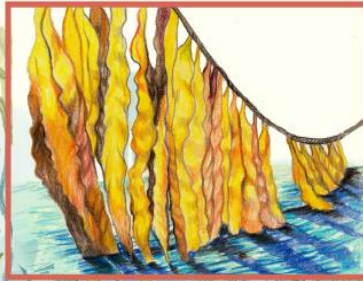
- **Competition between market applications**
- **Data availability**
- **Basis for market forecast**
- **Sensitivity of the market forecast**
- **Dynamic of the market forecast**

Key findings

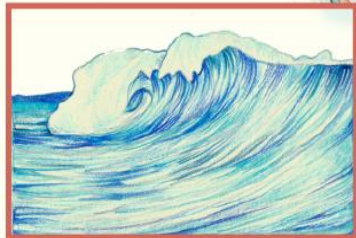
The many benefits of kelp



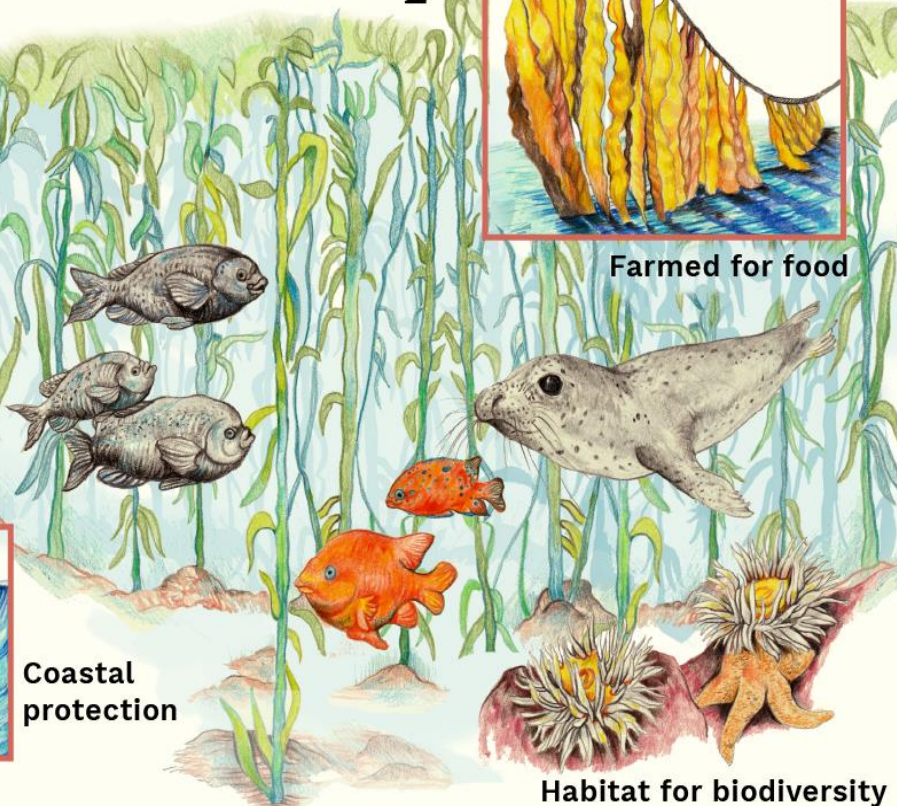
Removal of carbon & pollution



Farmed for food



Coastal protection



Habitat for biodiversity



Promising
Biostimulants
and animal feed



Key challenges:
availability,
competitive pricing,
and regulations



Green public
perception will
drive growth



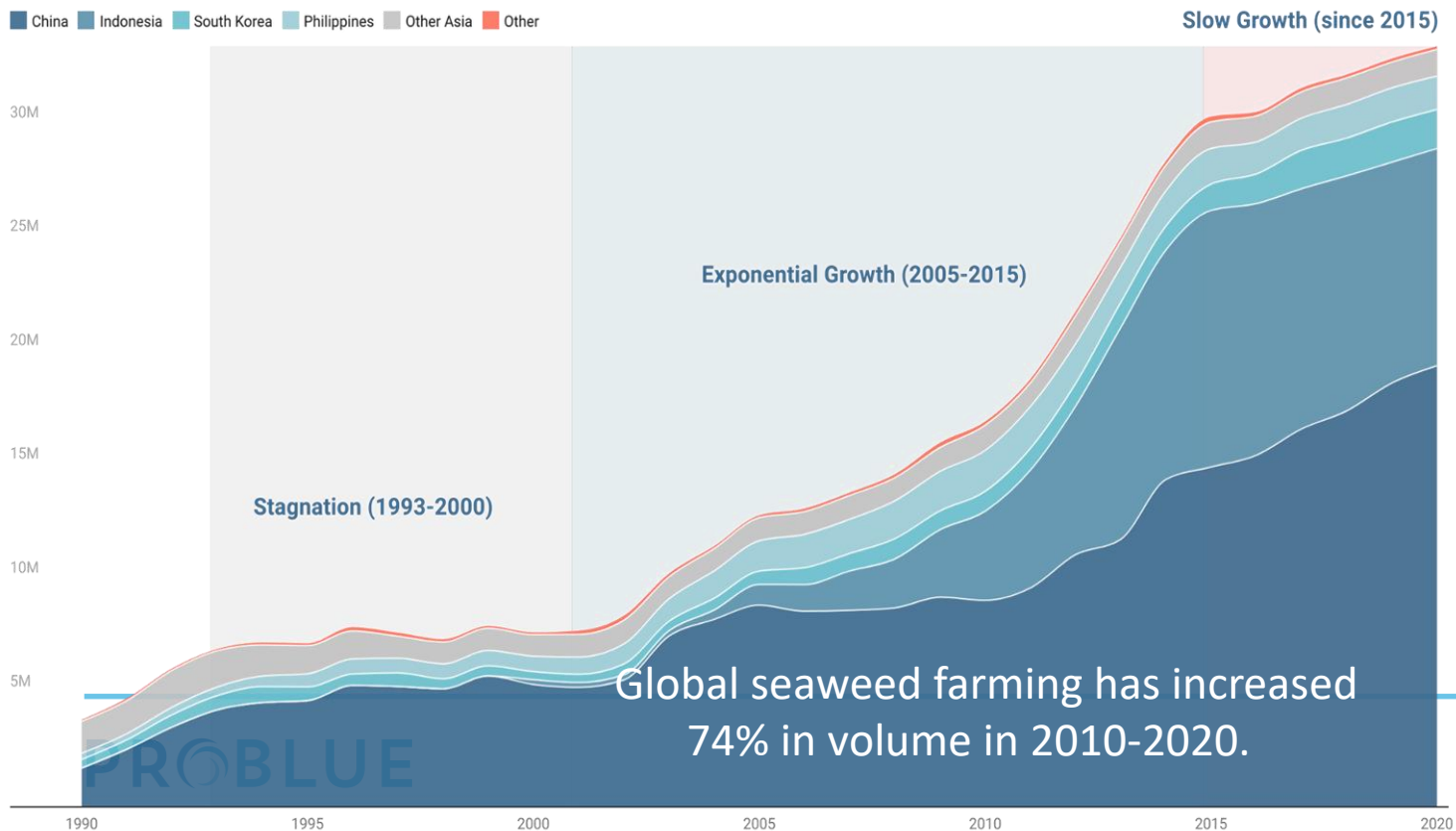
Key driver
Ecosystem services,
including climate change
action

Production in established seaweed regions faces major challenges and is slowing down

Data on volumes is inconsistent

Global production volumes 1990 – 2020

(wet weight, FAO 2022)



Identified Key Challenges in well established markets:

Climate change effects on crops

Shorter cycles

Lower yields

Increased disease

Extreme weather events

Lack of technology advancement

Farming in deeper waters

Automation in farm processes

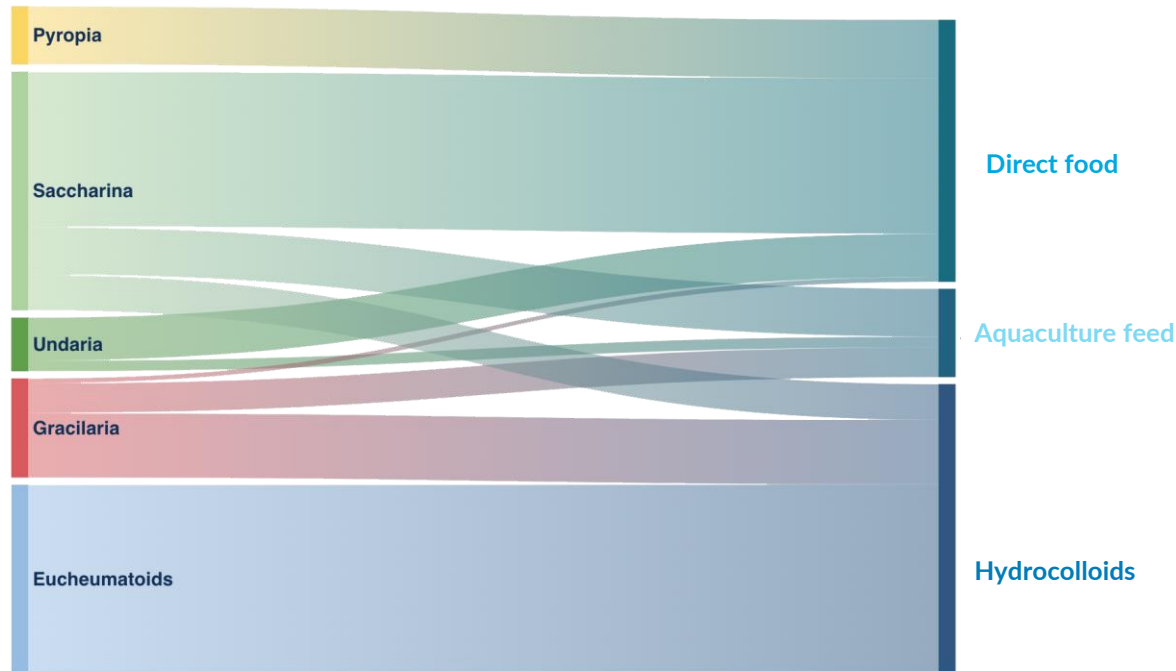
Lack of human capital

Aging population

Rural depopulation

Traditional markets absorb most seaweed produced in the established regions

Price volatility for seaweed commodities is high

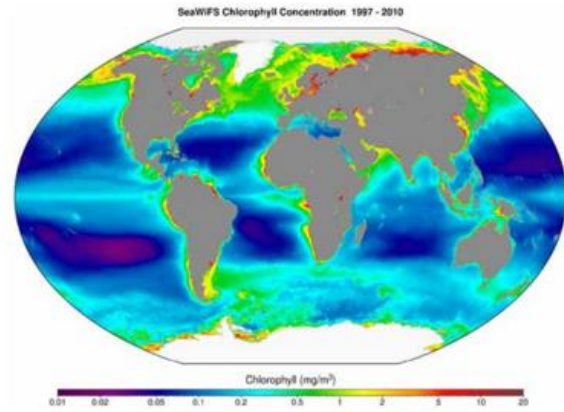


Supply availability requirements and limitations

Availability of raw material (seaweed) is a major challenge

- a. Volumes → Require **large-scale, low-cost** seaweed supply
- b. Consistent quality → Require **high quality, consistent** seaweed supply
- c. Price-level → Require **high quality, consistent** seaweed supply

Disclaimer: This is just on the basis of the field insights - therefore only data from the 6 countries studied - which account for 98% of global farmed seaweed according to FAO 2020 data



Chlorophyll-a density in the world's oceans

Source: NOAA



Selected new and emerging applications

Pharmaceuticals

Nutraceuticals

Biostimulants

Alternative Proteins

Animal Feed

Methane Reducing Feed Supplements

Pet Food

Bioplastics

Fabric

Construction

New and Emerging applications

Time to market entry for major potential seaweed applications

A summary of estimated time to market, according to industry sentiment and market analysis

Biostimulants



Animal feed



Pet food



Methane additives



Alternative proteins



Nutraceuticals



Bioplastics



Fabrics



Pharmaceuticals



Bioenergy



Construction



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Already in the market



Require high quality, consistent seaweed supply



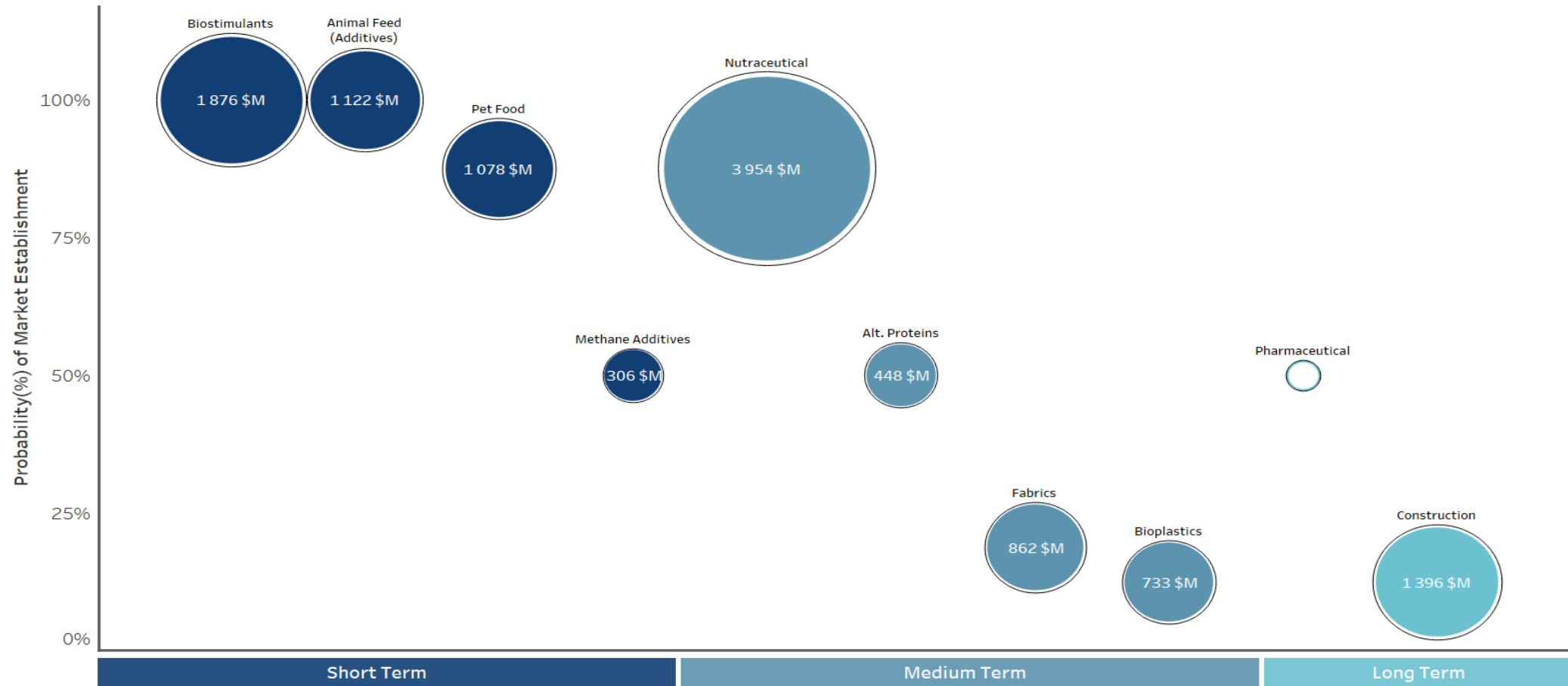
Require large-scale, low-cost seaweed supply

New and emerging applications by time horizon and likelihood of market establishment

Potential Applications of Seaweed by Time Horizon, Predicted Market Size by 2030 (\$M) and Probability of Market Establishment

Future Market Size

● Estimation Available ○ No Estimation



Global seaweed opportunities - key takeaways

Seaweed supply

Significant progress towards:

- Breeding programs
 - Automation of farm processes
 - Legislative incentives
 - Access to financial services
 - Capacity building
-
- Knowledge sharing.
 - Joint development.

**A clean,
resilient and
inclusive
seaweed
industry at
scale**

Potential markets

Novel applications technically proven

Market needs:

- Consistent raw material supply
- Scale + price + quality
- Access to long-term, low-cost capital
- Standardized environmental impact assessments
- Legislative incentives
- Social awareness and acceptance
- Biorefinery technology



Seaweed farming is for millions of people the primary source of livelihood



..and many more coastal communities could be growing seaweed - and benefit in numerous ways.



Seaweed Insight – seaweed farming datahub

<https://seaweedinsights.com/global-production/>



Explore Farm Design by Species



EUCHEUMATOIDS



SACCHARINA



UNDARIA



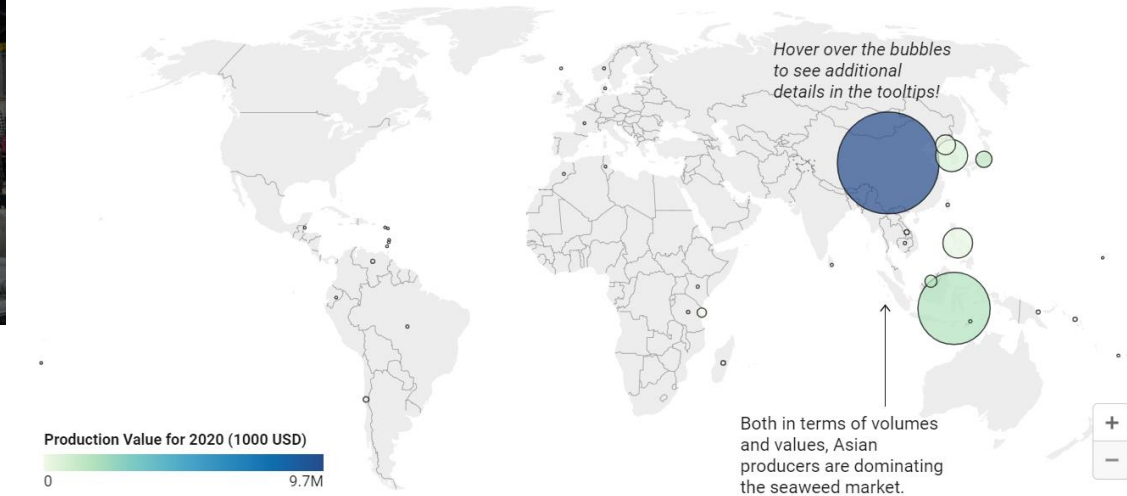
PYROPIA




GRACILARIA

Map of Global Seaweed Production in 2020

based on 2020 figures provided by FAO Fisheries and Aquaculture (volume in tonnes wet weight)



Map: Hatch Innovation Services • Source: FAO Fisheries and Aquaculture • Created with Datawrapper

An aerial photograph of a small boat on a vast aquaculture farm. The farm consists of numerous parallel rows of green, floating cultivation systems stretching across the deep blue ocean. The boat is positioned in the lower-middle section of the frame, moving between the rows. The water is a rich, dark blue, and the overall scene is captured from a high-angle perspective.

Thank you for your attention!

Gracias!

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