UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

Seaweed: an Ocean of Opportunities

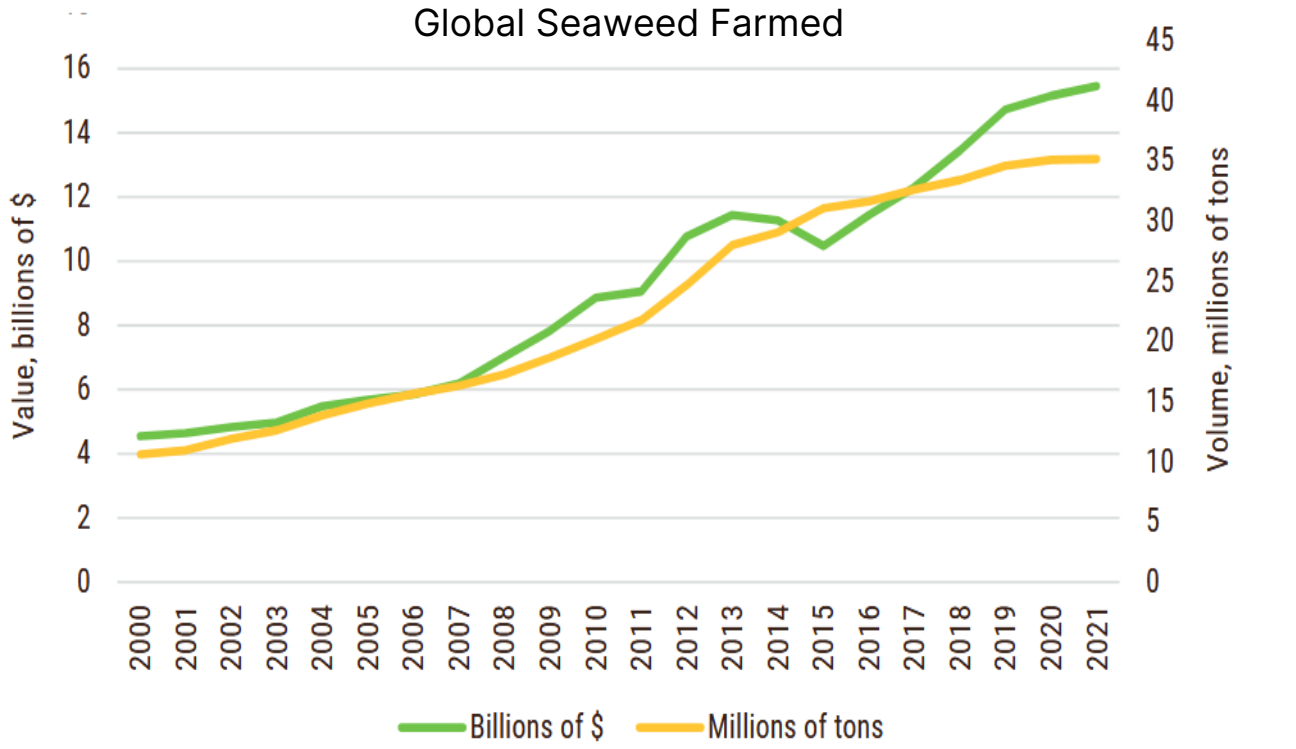
Exploring food and non-food applications

UN trade & development UNCTAD | 60 years

Seaweed: An Ocean of Opportunities

- An abundant and underexploited resource
- Immense potential to address 21st-century challenges
    - Climate change
    - Biodiversity loss
    - Rampant pollution
    - Competition for land

The seaweed farming boom



Source: UNCTAD, 2024 based on UNCTADStat

- Market value of this industry has more than tripled since the turn of the millennium
- Estimates suggest that the seaweed industry could balloon to an astounding $120.5 Billion

Overview of Seaweed Applications (1)

Human & Animal Nutrition

- Source: Harvard Health; Quelp Chile

Pharmaceutical, Nutraceuticals & Cosmetic Industries

- Source: Mwani Zanzibar, India CMFRI, Nama Fiji

Alternatives to plastics (PHAs, cellulose, coatings)

Source: Zerocircle, Uluu

Overview of Seaweed Applications (2)

Biofuels (mostly from microalgae)

- Source: UPS Battery Center

Environment

- Source: UNCTAD

Biofertilizer & phytosanitary product

Source: Connemara seaweed

Food Applications (1)

- Direct consumption: sushi, salads, soups
- Nutritional supplements: rich in essential elements
- Aquatic animal and livestock feed

- Combating nutritional deficiencies
- Source of proteins, vitamins and fibers
- Significant potential for global food security

Food Applications - Examples

Sushi

Source: Kikkoman

Salads/soups

Source: Harvard Health

Nutraceuticals (food complements)

Source: The Fish Site

Non-Food Applications

Agriculture:	Green alternative to chemical fertilizers and pesticides
	Natural soil enrichment and eco-friendly pest control
Energy:	Promising biofuel source
	Rapid growth, high biomass yield
	No competition with food crops for land or water
Pharmaceuticals:	Novel compounds for drug development
	Potential treatments: anti-inflammatory, anticancer properties
Cosmetics:	Nutrient-rich extracts for skincare
	Natural, effective beauty solutions
Textiles:	Sustainable, innovative fibers
	Reduced environmental impact
	Enhanced comfort and functionality (e.g., UV protection, moisture-wicking)

Algae as a substitute to plastics

Key Properties	Biodegradable and compostable Source of fibres and feedstock for PHA production Used in coatings and waterproofing (e.g., Zerocircle)
Environmental Benefits	Reduces dependence on non-renewable resources Helps mitigate plastic pollution
Applications	Packaging Utensils Toys
Industry Examples	Zerocircle NOTPLA

Promising alternative to conventional plastics

Seaweed as a substitute to plastics - Examples

Notpla's Alternatives to plastic bottles
Source: Notpla

Seaweed-based Polyhydroxialcanoates (PHAs)
Source: Uluu

Zerocircle's Alternatives to plastic coating
Source: Zerocircle

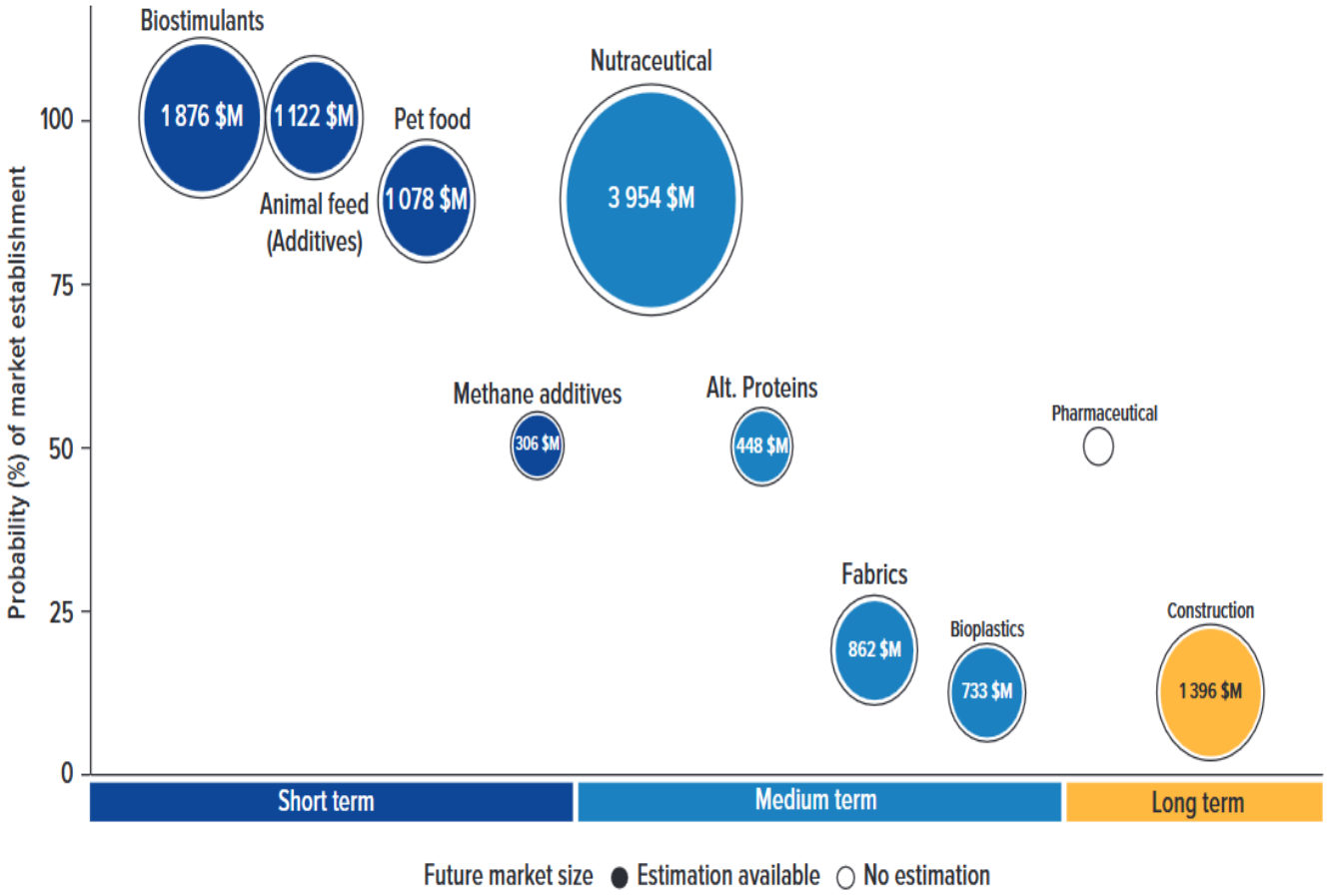
Environmental benefits

1. **Reduced Land Use Change**
    - Resource-efficient cultivation compared to traditional agriculture
2. **Carbon Capture and Storage**
    - Seaweed absorbs CO2 from the atmosphere
3. **Marine Ecosystems Restoration**
    - Seaweed farms enhance fish and crustacean fauna
4. **Reduction of Plastic Pollution**
    - Seaweed-based alternatives to plastics

Economic benefits

1. **Rapid Industry Growth**
   - Growing markets & applications
2. **Diversification of Coastal Economies**
   - Provides income and job opportunities, particularly for women in fragile coastal communities.
   - Supports sustainable livelihoods and reduces economic vulnerability.
3. **Reduction of Import Dependency**
   - Promotes local production and consumption, reducing reliance on imported materials
   - Enhances food security and self-sufficiency in coastal regions
4. **Export potential for developing countries**
   - Opportunities to expand seaweed farming beyond Asia, which currently dominates 98% of production.
   - Unlocks value chains and boosts global trade for developing nations

FIGURE A: Predicted seaweed market size by 2030 ($ millions) with chance of market establishment indicated by color on a high-level market horizon timeline



Social benefits

1. **Job Creation and Sustainable Coastal Economy**
    - Provides alternative livelihoods to potentially damaging activities (e.g., tourism, fisheries)
    - Offers year-round employment opportunities, supporting economic diversification in coastal areas
2. **Women Empowerment in the Seaweed Industry**
    - High gender inclusion, with women actively involved in cultivation and processing
    - Promotes economic independence for women in coastal communities
3. **Improvement of Nutrition and Public Health**
    - Seaweed as a nutrient-rich food source
    - Potential for developing health-promoting products

SMEP & Pilot Project in Kenya

1. **SMEP Programme**
   - Sustainable Manufacturing and Environmental Pollution programme
   - Established by UK's Foreign Commonwealth and Development Office, implemented with UN Trade and Develoipment (UNCTAD)
   - Aims to reduce environmental pollution at source in developing countries
2. **Catchgreen Project**
   - Part of SMEP programme
   - Focus on biodegradable alternatives for fishing and aquaculture
3. **Pilot Project in Kenya**
   - Testing Biodolomer®Ocean ropes for seaweed farming
   - Collaboration with KMFRI and Kibuyuni seaweed farmers
   - Aims to reduce plastic pollution in marine environments
   - Empowers local women in seaweed farming industry

SMEP

Sustainable Manufacturing and Environmental Pollution Programme

Case Study: Mwani Center in Zanzibar

1. **Innovative Business Model**
   - Transforms seaweed into high-value skincare products
   - Empowers local women through employment and training
2. **Economic Impact**
   - Farmers earn five times the average income of freelance seaweed farmers
   - Expanding international market presence
3. **Sustainability Focus**
   - Uses traditional knowledge combined with scientific research
   - Member of the Safe Seaweed Coalition
4. **Social Innovation**
   - Selected for Cambridge Social Ventures Cohort
   - Winner of Capgemini's Blue Challenge 2022

Note: We will visit Mwani Zanzibar on Thursday for our field trip!

Source: Mwani Zanzibar

LIVING

Meet the "Mwani Mamas," a Group of Zanzibari Women Changing Their Lives Through Seaweed Farming

BY ANNIE DALY

April 22, 2024

Challenges and Solutions for Seaweed Industry

1. **Environmental Challenges**
    - Climate change impacts on seaweed growth → Solution: Develop climate-resilient species
    - Pollutant Accumulation in Contaminated Areas → Solution: Establish cultivation zones away from pollution sources and implement strict regulations on industrial discharges.
2. **Market Challenges**
    - Price volatility and limited market access → Solution: Diversify products and markets
3. **Technological Challenges**
    - Limited processing capabilities → Solution: Invest in local processing facilities
4. **Policy Challenges**
    - Lack of supportive regulatory frameworks → Solution: Develop seaweed-specific policies and regulatory frameworks
5. **Safety Challenges**

- Presence of Toxic Algae → Solution: Educate consumers on edible algae, implement harvesting protocols for fresh algae, and monitor for harmful algal blooms.

Conclusion: Seaweed Industry's Potential

Opportunity for sustainable blue economy growth

1. **Benefits :**

- Economic
- Environmental
- Social

2. **Future Outlook**

- Growing global demand for seaweed products
- Opportunity for blue economy growth and coastal development

Mwani is money.

(Saying in Zanzibar)

It demonstrates how development, climate, and nature work together to generate value and uplift communities.

(The World Bank)