

Seaweed Aquaculture in Sri Lanka: Challenges and Policy Recommendations for the Sustainable Development of the Industry

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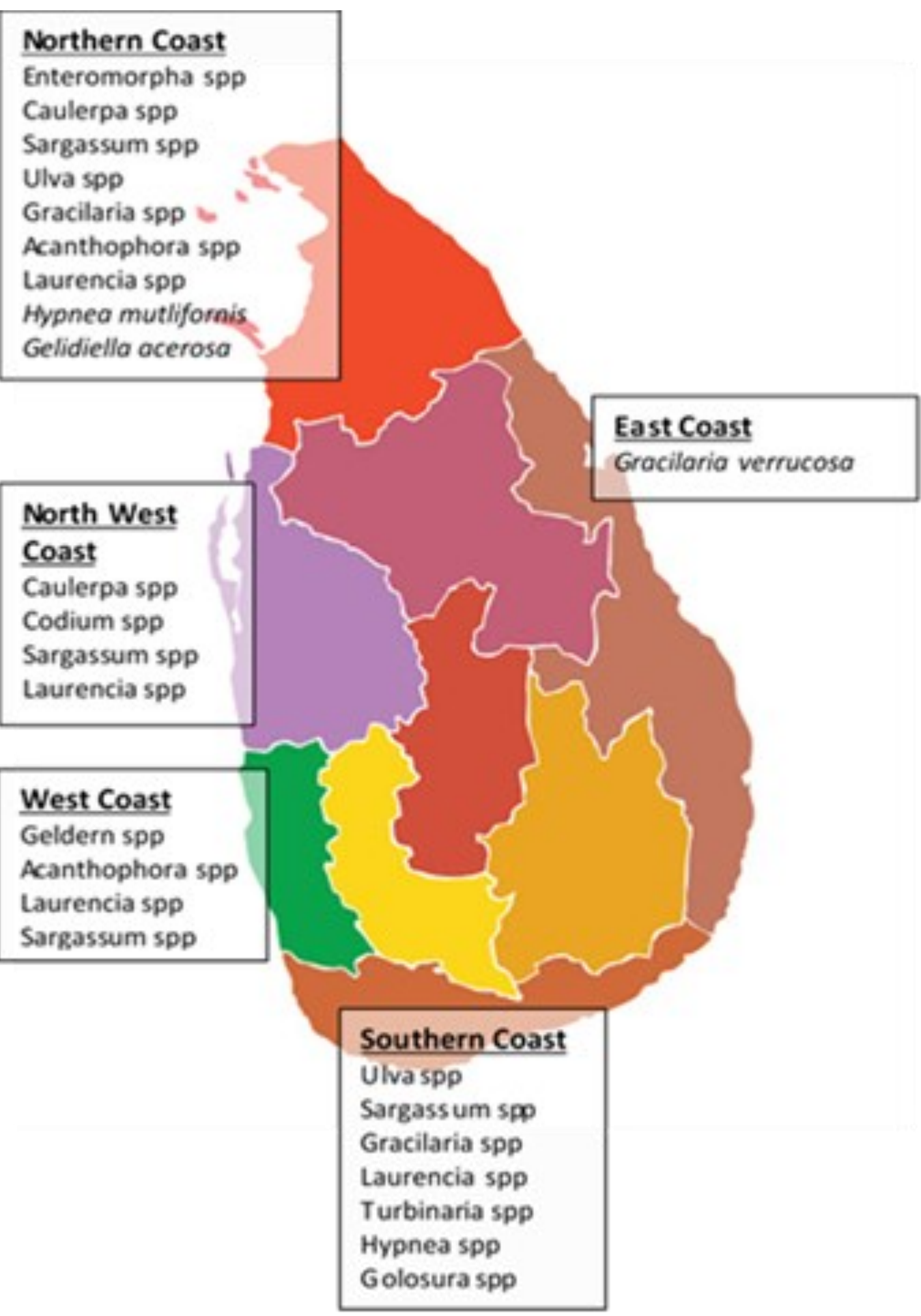
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Introduction

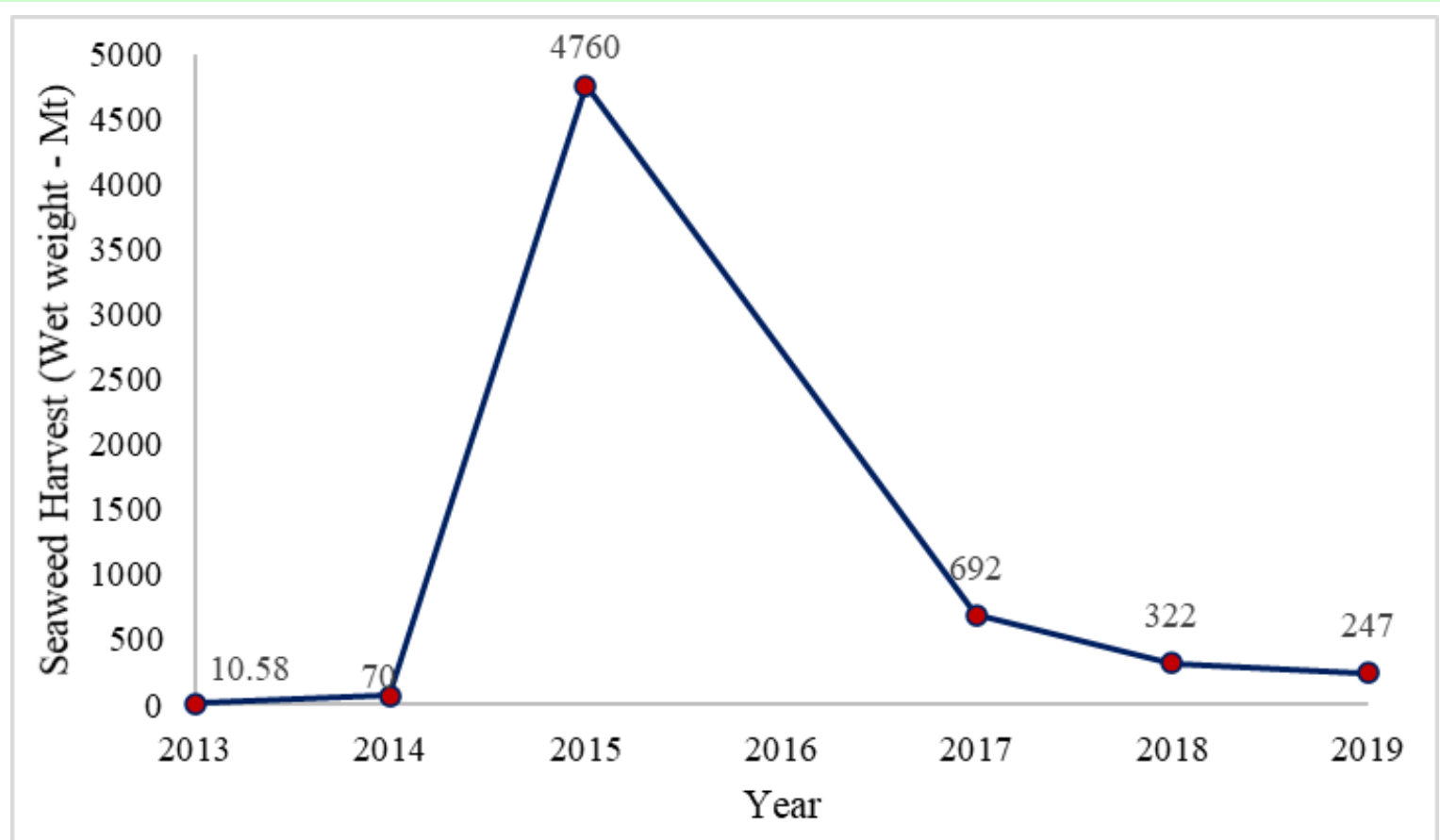
Sri Lanka which is located in the Indian Ocean, near the Southeast tip of India, is a tropical island with an area of 65, 610km². Over the past four decades, aquaculture industry has shown a positive contribution to national economy, poverty reduction and food security of the country. Sri Lanka possesses nearly 400 seaweed species along the coastline where the extent is estimated as 1,585km^(1,2). In 1950's, alginates rich Sargassum species was the most common brown seaweed in Sri Lanka. And seaweeds were abundant along the Northern to Southern coast in Sri Lanka. But a few species had been identified in East coast⁽³⁾. *Gracilaria edulis* and *Gracilaria verrucosa* which was known as ‘Ceylon moss’ had had good international demand since 1800's. Dried bleached Ceylon moss which were collected from the natural environment, exported extensively to England, India and Japan until 1980's^(3,4). However, seaweed trade has diminished due to the decline of the natural stocks and deliberate adulterations⁵.

In 2008, seaweed farming concept was initiated collaboratively with the public - private partnership. Substantial growth of seaweed production can be observed since then, while providing numerous **employment opportunities for coastal communities particularly for women**. Although Sri Lanka has diversified seaweed repository, exotic carrageenophytes, *Kappaphycus alvarezii* is the only seaweed species commercially cultivated in Northern and North Western coasts targeting export market at present^(2,6).



Average employment opportunities for 25 seaweed rafts⁽⁷⁾

Management practice	Man/male days	Women days
Site preparation	5	2
Seedlings selection and preparation	-	1
Hauling of seedlings	-	1
Planting	-	4
Care of crops	-	12
Harvesting	1.5	4
Hauling of produce	0.5	2
Drying	-	2
Packaging	-	2
Total	7	30



Seaweed production in Sri Lanka from 2013 to 2019⁽⁸⁾

Seaweeds along the Sri Lankan coast⁽³⁾
(Based on the first survey conducted in 1952)

Objectives

- To highlight the **present challenges** faced by Sri Lankan seaweed industry
- To suggest **policy recommendations** for sustainable development of the industry

Methodology

Secondary Data Collection

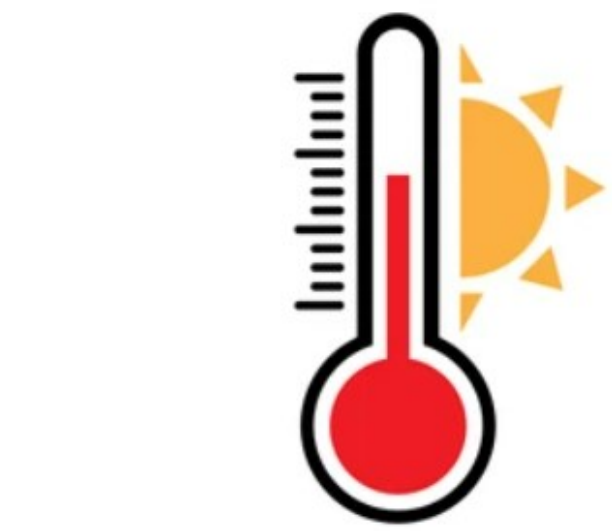
Electronic search (ScienceDirect, Google Scholar, and Scopus) for articles published in peer-reviewed journals

Library search for some books on seaweed aquaculture

Government reports on fisheries statistics & trade publications

Results and Discussion

Environmental Challenges



Longer periods of high temperatures



Heavy rain falls



Stronger waves

(associated with seasonal monsoon weather patterns)

Limit the cultivation cycles per year
(Starting from mid-May to February)

- Harvesting immature seaweeds
- Detaching seaweeds from floating structures
- Retarding the growth and quality of seaweeds

(Images: <https://www.google.com/>)

Socio - economic Challenges

Inferior quality of parental materials

- Clonal propagation of seaweeds using older stock or previous harvest impede the growth and quality of seaweeds.
- Farmers are unable to get optimum harvest.



Marketing issues

- Low farm gate prices
- Non-existence of standard prices for seaweeds at local trade

Absence of proper sites for seaweed farming

- Conflicts with other industries and some legal frameworks on coastal management
- Lack of knowledge on relevant competent authorities for taking licenses for seaweed aquaculture ventures

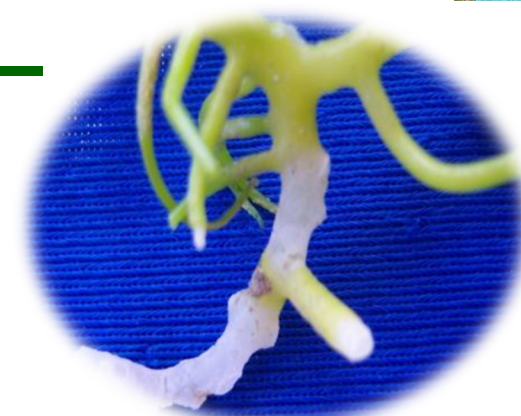
Lack of standards for post-harvest practices and value-added products

- Difficulties in drying seaweeds during the rainy seasons.
- Lack of technological and financial support for value addition of seaweeds



Pest and disease outbreaks

- “Ice- ice” disease of *K. alvarezii*



Unforeseeable challenges in the future

Clonal propagation of non-native species/ Seaweed domestication

- Genetic erosion of seaweeds
- Drastic reduction of their genotypic variability
- Increasing the pest and diseases epidemics
- Gene swamping - ‘Risk of crop to wild gene flow’



Policy Recommendations

For **environmentally friendly** and **socially responsible** seaweed aquaculture:

Increasing the seaweed aquaculture culture production

- Identify suitable new areas for seaweed aquaculture development considering physico - chemical properties of water and social - economical factors
- Preparing zonal plan for seaweed aquaculture along the coastline and declaration of designated areas for seaweed aquaculture through a government gazette
- Strengthening research and development activities - E.g: Production of new strains, identifying effective and efficient micro propagation methods
- Prioritizing native seaweed culture

Promoting investments on seaweed aquaculture

- Educating and attracting investors to invest in seaweed industry - Media advertisements
- Tax reductions and incentives for investors related to export seaweed industry
- Promoting public - private partnership for seaweed aquaculture ventures
- Precise regulations and guidance

Diversifying seaweed aquaculture systems

- Promoting different types of culturing methods - E.g: floating, fixed off bottom, broadcast methods
- Promoting the culture of different species to facilitate investors with high demand species to induce export
- Promoting community-based seaweed aquaculture and empower women in the coastal areas to engage in seaweed farming

Post-harvest technology development of seaweeds

- Proper drying and storage facilities to improve the quality of the seaweed

Financial assistance to develop seaweed aquaculture

- Developing low interest loan and insurance schemes for developing seaweed farming

Improving the productivity of seaweed aquaculture

- Providing extension services
- Capacity building of seaweed farmers E.g: Disease diagnostics, seaweed propagation
- Establishing facilities for quarantine of seedlings or crop stock to ensure the biosecurity
- Partnership with national and private bodies to establish seed banks - E.g: Disease resistant seeds, high yield varieties

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