

Employment potential of fisherwomen in the collection and post harvest operations of seaweeds in India

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ABSTRACT

Seaweeds are the renewable marine resources and they form the primary raw material for the *agar* and *algin* industries. They are mostly exploited from the south east coast of Tamil Nadu from Mandapam to Kanyakumari, Gujarat Coast, Lakshadweep islands and the Andaman and Nicobar islands. Even though substantial resources are available in our coastal waters, it is neither harvested to its fullest extent nor much efforts have been put forth. Seaweed collection renders extensive employment to the coastal fisher folk. The estimation of seaweed resources indicate that only a negligible quantity is harvested. At present nearly 5000 women depend on the seaweed industries for their livelihood. If the available resources are harvested to its optimal level, it can provide employment to another 20,000 coastal fisher folk in harvesting sector and an equal number in post harvest activities. Since the domain of seaweed collecting industry is mainly dominated by women, special efforts should be taken for its optimum exploitation and market expansion through diversified product development and their popularization. This paper deals with the employment potential of fisherwomen in seaweed industries, problems and prospects in the collection and processing segments of seaweeds.

Introduction

Seaweeds are not weeds as the name implies. But they are the renewable marine resources of value, growing well in shallow waters where suitable substratum for its growth exists. They are exploited from the south east coast of Tamil Nadu from Mandapam to Kanyakumari, Gujarat Coast, Lakshadweep islands and the Andaman and Nicobar islands although they grow in the vicinity of Mumbai, Ratnagiri, Goa, Karwar, Varkala, Kovalam, Vizhinjam, Visakhapatnam and few other places like Chilka and Pulicat. Seaweeds still remain as a core source for the

production of phyto chemicals such as *agar* and *algin*. The continuous supply of raw materials for the *agar* and *algin* industries in India have been from the natural seaweed beds of Tamil Nadu coast. Eventhough current supply is more from Tamil Nadu, the seaweeds from deep waters of Tamil Nadu coast are still unexploited.

Fishermen and women living along the coast are involved in exploiting the resources but still the resources are not being fully utilized since people in the villages are ignorant about its utility and economic importance. It is observed that poor, to a much greater extent than rich are dependent on their

immediate environment and setting for their livelihood, (Herederao, 1978). So it is essential to encourage the coastal fisher folk to utilize these seaweed resources fully. The objectives of the study include employment potential of fisherwomen in seaweed industries, their socio economic profile, role in seaweed collection and the constraints faced in seaweed collection/ cultivation.

Methodology

The study was conducted in the Ramanathapuram district of Tamil Nadu. Two villages namely *Chinnapalam* and *Keelakkarai* were selected where majority of the people are involved in seaweed collection. A total of 30 samples were selected from these two villages by random sampling. Data were collected using interview schedules. Interviews were also held with seaweed processing industries for data collection. Secondary data were obtained from the published literature. The scale developed by Mansingh (1993) was used to measure the social participation, mass media contact and extension agency contact of the respondents. The respondents were categorized as low, medium and high levels using mean and

standard deviation.

Seaweeds and its employment potential

The standing crop of seaweeds in the coastal waters is depicted in Table 1 and the employment potential is also analysed. It is estimated that the total standing crop of all type of seaweeds in Indian waters is about 2,60,876 tonnes (Kaladharan and Reeta Jayasankar, 2003). Among the states Tamil Nadu (37.35%) ranks first in resource potential followed by Andaman and Nicobar islands (34.85%). Currently considerable level of harvesting of seaweeds (11%) is undertaken in the Gulf of Mannar region of Tamil Nadu. Studies conducted by Irulandi and Daniel (1999) showed that about 2100 fisher folk were involved in seaweed collection in six villages of Ramanathapuram district. The employment potential for harvesting the standing crop of the country as a whole is worked out as 52, 174 persons. (Table 1). Two harvests can be made for optimizing the production from the open sea. The manpower required for fully harvesting the standing crop is considered as the employment potential in this sector. However, the present employment in this sector is less than 10,000 in which more than 50 % are women.

Table 1. Estimated standing crops of seaweeds and employment potential

State	Total crop (wet weight in tonnes)	Percentage	Estimated potential of employment (Labour days) per year	Full time employment potential (persons)
Andaman and Nicobar	90,939	34.85	36,37,560	18,187
Tamil Nadu	97,416	37.55	38,96,640	19,483
Gujarat	20,155	7.73	806200	4031
Maharashtra	20,000	7.66	8,00,000	4000
Lakshadweep	19,345	7.42	7,73,800	3869
Andhra Pradesh	7500	2.87	3,00,000	1500
Orissa	2521	0.97	10,0840	504
Goa	2000	0.77	80,000	400
Kerala	1000	0.38	40,000	200
Total	2,60,876	100	1,043,5040	52,174

The price structure of different types of seaweeds has been collected from Ramanathapuram district of Tamil Nadu and the total economic value of the standing crop was estimated on the basis of the average market price at first sales. Although seaweed products like *agar* and *algin* command very high price, still the wet seaweeds could not fetch a premium price at the primary collection centres due to unorganized harvesting pattern and associated marketing problems. Value addition by locating supply based processing industries may enhance the utility demand and the price of raw seaweeds at primary production centres (Devaraj *et al.*, 1999). Substantial quantity of seaweeds available in our coast is edible in nature, which can highly supplement protein requirements of our people. In this context, massive awareness programmes should be organized to create favourable attitude of our people to consume more edible seaweeds in different forms and also to concentrate more in preparing value added products to fetch more price of this valuable commodity. The proportionate availability of different type of seaweeds was worked out based on the data. The total value of the standing crop works out at Rs. 174.70 million. (Table 2).

Export trend and production potential of products

The export trend of seaweed products has drastically declined over the

years. This could be due to the reason that the seaweed products produced are locally required. The high price variation in unit price is due to product differentiation. To meet the domestic requirements, *agar* and *algin* are imported. Hence there is an immense possibility to enhance the exploitation of the available resources and cultivation of economically viable seaweeds in our coastal waters. Currently only 110 to 132 t of dry agar as against the potential of 390 t and 360-540 t of *algin* as against the potential of 1040 t of *algin* per annum are produced in the country. Although the production potential of carrageen is 520 t, only insignificant quantity is produced by a firm in Tamil Nadu.

Table 3. *Agar agar/ seaweed export from 1992 to 2001*

Year	Quantity (Kg)	Value (Rs)	Unit price
1992	15260	352765	23.11
1993	-	-	-
1994	2191	400863	182.95
1995	16075	183750	11.43
1997	549	143124	260.69
1998	768	202681	263.90
1999	994	177360	178.43
2000	50	50678	1013.56
2001	20	19694	984.70

(Source, MPEDA, 2001)

Table 2. *Price structure and economic valuation of seaweeds*

Type of seaweeds	Wet weight (tonnes)	Average price / kg (Rs)	Total value (Rs. in lakh)
Agar yielding	15,600	3.50	546.0
Algin yielding	41,600	0.50	208.0
Carrageenan	20,8000	0.40	83.2
Other edible weeds/ grasses	1,82,000	0.50	910.0
Total	2,60,000	0.67	1,747

Profile of seaweed collectors

Majority (60%) of the fisherwomen involved in seaweed collection belonged to young age group (<35 years) and had primary level of education (67%). For 83 per cent of the fisherwomen seaweed collection formed the main occupation. Nearly 40 % of the fisherwomen had medium level of experience (10 to 20 years) in seaweed collection. More than 45 percent had medium level of mass media contact (47%), extension agency contact (47%) and social participation (50%) (Table 4).

Women in seaweed collection along Tamil Nadu coast

Both men and women in the Gulf of Mannar region of Tamil Nadu are involved in seaweed collection. Their main source of income is derived through collection of seaweeds. They go for collection of seaweeds in the vicinity of all the 26 islands located in the region. They move about to different places in and around the island and collect matured seaweeds so as to get a better price. Women groups of 6 to 10 hire a *vathai* (boat)

for Rs 5 to Rs. 25 per day. They start early in the morning by 4 am and return back by 12 noon which vary with the tidal situations. They collect the seaweed from a depth of 2 to 3 metres. They stand in knee deep waters, wear a mask and hand pick the seaweeds. A gunny bag with a capacity of 8 to 10 kg is tied around their waist and the hand plucked weeds are gathered in the bags.

Restriction to collect seaweed from the islands and their stay in the islands pose main problems. The livelihood of the fisher folk is mainly dependent on seaweed collection. 'Middlemen exploitation' was reported as a problem by 77 per cent. As in the case of fisheries, in this field also middlemen involvement affects, the price. Lack of adequate place for drying is a major problem with 73 per cent of fisherwomen. If the fisherwomen dry the seaweeds, they get more money. 'Seasonal employment' was given as a constraint by 67 % of fisherwomen. During rainy season they were not able to go for seaweed collection and as an alternative they go for *chank* collection. 'Injuries to

Table 4. Socio economic profile of seaweed collectors

Profile characteristics	Categories			
	Young	Middle	Old	
Age	18 (60%)	8(27%)	4(13%)	
Education	Illiterate 4(13%)	Primary 20 (67%)	Middle 4 (13%)	High 2 (17%)
Occupation	Main 25 (83%)	Subsidiary 5(17%)		
Experience	Low 10 (33%)	Medium 12 (40%)	High 8(27%)	
Type of family	Nuclear 21(70%)	Joint 9 (30%)		
Mass media contact	Low 8 (27%)	Medium 14(47%)	High 8(26%)	
Social participation	Low 9 (30%)	Medium 14(46.66%)	High 7 (23%)	
Extension agency contact	Low 8 (26%)	Medium 15(50%)	High 7 (23%)	

Figures in paranthesis indicates percentage

fingers' are reported by 63.33 per cent creating health problems besides causing physical strain. 'Low price of seaweeds' was reported by 60 per cent of fisherwomen since they are getting money as advance from the local agents due to their indebtedness and financial constraints (Table 5).

'No area in the sea to take up cultivation is earmarked' and this was reported as a problem by 80 per cent. Since they do not have specific enclosed area, they are not able to take up the cultivation. 'Lack of finance' was reported as a problem by 80 per cent. In order to adopt the technology, they need capital money, which they find it difficult. 'Lack of training' was a problem reported by 75 per cent. Fisherwomen were well aware about the seaweed cultivation but still they were not confident enough to venture into this because of inadequate training. Sixty seven per cent reported that 'fish grazing' is one of the reasons

leading to low production of seaweeds in cultivation. Sixty percent of them are of the opinion that there are no government schemes to encourage fishermen to take up seaweed culture as an initial attempt (Table 6).

Seaweed industries

Although commercial scale of selling of seaweeds was first established at Mandapam in India in 1966, the growth of seaweed industries is not significant. During 1981 there were 21 *agar* industries and 25 *algin* industries in India. (Silas and Kalimuthu, 1981). Seaweed factories manufacturing *agar* and *algin* are mostly located in Madurai, Trichy, Ahmedabad, Baroda and Hyderabad. Annually about 5000 t (dry weight) of alginophytes *Sargassum* spp, *Turbinaria* spp and *Cystoserira trinodis* and 1000 t (dry weight) of agarophytes *Gelidiella acerosa*, *Gracilaria edulis*, *G. crassa* and *G. foliifera* are used as raw materials by these industries.

Table 5. Constraints encountered by fisherwomen in seaweed collection

Constraints	Number	Percentage
Restriction in collection of seaweeds	30	100
Stay in the islands restricted	30	100
Middlemen exploitation	23	77
Lack of adequate place for drying	22	73
Seasonal employment	20	67
Physical strain/injuries in hand	19	63
Lower price	18	60
Looking after children and other household activities	16	53

Table 6. Reasons for non adoption of seaweed cultivation

Constraints	Number	Percentage
No earmarked area	24	80
Lack of finance	24	80
No proper training	22	75
No insurance	22	75
Fish grazing	20	67
Lack of credit facilities	19	63
No subsidized government schemes	18	60
Social problems	15	50

Nearly 25 agar industries in Kerala, Karnataka, and Tamil Nadu produce 75 t of agar.

In recent years, many entrepreneurs have come forward to start these industries as a result of which there will be great demand and competition for the raw material. Generally the industries in Kerala transport dry seaweeds from Tamil Nadu coast by road. They collect from agents who have collection centres at Tamil Nadu. Many persons were engaged as daily wage labourers. In Tamil Nadu, the average agar production capacity of the industries ranges between 500 to 800 t. Mostly there are eight to ten workers in each unit. The men are paid Rs.1750 as wages and women are paid Rs.1500 per month. The dried seaweeds are purchased at the rate of Rs.22 to Rs. 25 per kg. Problems encountered by seaweed industries are many such as no assured supply of seaweeds, poor quality seaweeds due to lack of proper drying, fungal infestations and adulteration of seaweeds with small shells and seagrasses, less agar production and its low gel strength.

Conclusion

Since seaweed cultivation has to be taken up in open sea, it is quite necessary to bring out some suitable measures. Even though women are involved in seaweed collection, they consider this as an income generating activity and not fully aware about its demand and value. Necessary steps may be taken to make the fisherwomen to know about its nutritive value and involve them in marketing, sales promotion and popularization of edible seaweeds. Currently the domestic demand for edible seaweeds is very less due to lack of consumer preference. Since there is greater requirement for agar, algin and carrageenan, more industries should be encouraged to come up by giving subsidies. The seaweed resources of the Andaman and

Nicobar islands come to 37 % of the total standing crops and hence there is a potential for commercial exploitation from these islands. Diversified utilization of seaweed in other areas like manure or as feed need to be enhanced.

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Literature cited

- Devaraj, M., V. K. Pillai, K. K. Appukuttan, C.Suseelan, V.S.R. Murthy, P.Kaladharan, G.SudhakaraRao, N.G.K.Pillai, N.N.Pillai, K.Balan, V.Chandrika, K.C.George and K.S.Shobhana 1999.Package of practices for sustainable eco-friendly mariculture land based saline aquaculture farming and sea farming. *Proc.Fourth Indian Fisheries Forum*.
- Hereder Rao, J.M. 1978. An experiment in non formal education, In : *Rural development and social change*. Mittal publications, New Delhi. 6 pp.
- Irulandy, S. M. and Daniel S. Dev 1999. Commercial exploitation of seaweeds by fisherfolk in Gulf of Mannar: their socio economic status and problems. *Seaweed Res. Utiln.*, 21 (1&2): 125-127
- Kaladharan, P. and Reeta Jayasankar 2003. Seaweeds. In : *Status of exploited marine fishery resources of India*. Mohan Joseph and A.A.Jayaprakash (ed) CMFRI, Cochin. pp. 228-239
- Mansingh, J. Paul 1993. *Construction and standardization of socio economic status scale*. Ph.D Thesis, TNAU, Coimbatore.
- MPEDA 2001. *Statistics report of Marine Products Export Development Authority*, MPEDA, Cochin.

Sakthivel, M. 1999. Resource potential, present status and solutions to the problems of seaweed cultivation in India. *Seaweed Res. Utiln.*, 21 (1&2) : 15-39.

Silas, E. G. and S. Kalimuthu 1987. Commercial exploitation of seaweeds in India, *Bull. Cent. Mar. Fish. Res. Inst.*, 41: 55-59.

Seafood Safety Norms and Marketing Management of the Marine Fisheries Sector in India

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All the developments brought about in different sectors of fishery production, processing, storage and distribution for fish are oriented mainly towards export markets. Commercial significance of primary markets has been mostly shifted to new value-added products. The present paper studies the market trend, market value of marine fishes at local and international and also makes a comparison of the price structure of marine products in domestic and export markets. It also evaluates the export performance of fish and value-added products and their socio-economic impact on domestic trade. The adoption of seafood safety norms in local domestic and export marketing system is also elucidated, along special emphasis on the need for improving the quality standards maintained in the domestic markets. The policy implications of the need to evolve appropriate utilization strategy for the value-added products of seafood diversification, keeping good hygienic standards in domestic marketing, regulation of fish and exports to stabilize the domestic marketing system, availability of pharmacologically important marine products and promising market prospects of commercially important perishable products and by products are also discussed in detail in the paper.

Keywords: Seafood marketing, export market, price structure

Fisheries play a vital role for ensuring the food security, which is most significant in the developing countries like India, where population is increasing and is characterized by high birth rate. Fisheries help in supplementing the protein food requirements of the population. In addition to providing a lot of employment opportunities, there is appreciable increase in marine and inland fish production over the past decades. However, the growth rate in the inland fish production, which includes aquaculture, is far higher than the marine sector. Various reasons. The marine fisheries sector of the country is also witnessing an era of many significant strategic changes. The present part of the paper discusses the changes, evolution in "new-age fisheries" in marketing