

SEAWEED RESOURCES OF KERALA COAST

V. S. KRISHNAMURTY CHENNUBHOTLA, B. S. RAMACHANDRUDU,
P. KALADHARAN & S. K. DHARMARAJA

Central Marine Fisheries Research Institute, Cochin-31

ABSTRACT

V. S., Krishnamurthy, Chennubhotla, Ramachandrudu, B.S., Kaladharan, P & S. K. Dharmaraja. Seaweed resources of Kerala Coast, *Aqua. Biol.* Vol VII - 1988

Surveys conducted for the first time recently along the Kerala coast have indicated the presence of seaweeds at the following locations: Mullur, Vizhinjam, Kovalam, Chilakoor, Varkala, Edava, Tankasseri, Thirumullavaram, Kovilthottam, Cheria Azhikkal, Perumpally, Thekkodu, Pallithodu, Chellanam, Kondakadavu, Elathur, Kadalur (Nandi) Madapalli, Thalayi, Tellicherry, Pallikere and Kanutheertha. The biomass varied from 0.5 to kg/m² to 6 kg/m² and mostly they are present upto 0.5m depth level.

Among the 34 species found, the agar-yielding sea-weeds such as *Galidium*, *Gracilaria* and *Pterocladia*, the agaroid yielding *Hypnea* and *Acanthophora*, the algin yielding *Sargassum*, *Padina* and *Dictyota* and the edible species *Ulva*, *Caulerpa* and *Enteromorpha* are important along the Kerala coast,

INTRODUCTION

Seaweeds, the macroscopic algae of the sea form a very important renewable resource that occurs on the rocky substratum in the littoral and sub-littoral regions.

Information about the coastal marine algae of Tamil Nadu (Subharamaih *et al.*, 1979), Gujarat (Desai, 1967; Sreenivasa Rao *et al.*, 1964; Chauhan and Krishna Muriy, 1968; Bhanderi, 1974; Bhanderi and Trivedi, 1975; Chauhan and Mairah, 1978), Maharashtra (Untawale *et al.*, 1979), Goa (Dhargalkar, 1981), and Lakshadweep (Subharamaih *et al.*, 1979) is already available. Whereas for Kerala coast not much information is available except for the preliminary work of Balakrishnan Nair *et al.*, (1982) for a portion of Kerala coast, Ashtamudi lake and shore length from Poovar to Kanyakumari. Therefore, a detailed survey has been made to study the seaweed resources along the Kerala coast from Kollamkode to 4 km north of Manjeswar (Thalapadi) being the two extremes of Kerala coast.

MATERIALS AND METHODS

A total number of 186 stations were covered during this survey extending from August '86 to April '87. Each station was fixed at intervals of 3 kms. At each station, three transects were selected namely Centre, north and south with respect to north line. The distance between the centre to north and centre to south was 100 m thus making the length of the sample stretch 200m. At each transect seaweed samples were collected using a $\frac{1}{4}$ a metre quadrat at 0.0m and 0.5m depth levels as the seaweeds were generally found in this belt along this coast. The sampling area for each stretch on an

average was 400 sq.m. The samples were weighed individually for different species and recorded per square meter. Data on the environmental factors such as temperature, salinity, dissolved oxygen, nutrients, wind direction and velocity were also collected simultaneously as supplementary information.

The data collected on the seaweed quantities were computed and processed.

RESULTS AND DISCUSSION

The coastline of Kerala is dissected with sandy stretches and natural rocks and also artificial granite sea walls on groynes and spurs which protrude into sea. The natural rocks are of laterite, granite or calcareous origin of different kinds. The sandy beaches are interrupted by rocky cliffs at Vizhinjam, Varkala, Quilon light house, Kollam (Tikkodi), Sacrifice rock (Vellarangal off Payyoli), Cannanore Fort and light house, Mount Dilli (Ezhimala hill), Bekal Fort. Inter-tidal and sub-tidal rocky substrata were observed at Mulloor, Kovalam, Varkala, Thangaseri, Thirumallavaram, Kadaludingaram, Beypore, Pudiappa, Chettikulam (Elathur), Nandi light house, (Tikkodi, Mahe, Tellichery, Mulappilangadi, Cannanore, Kanutheertha (Manjeswar). Unlike other places, Varkala creek area was observed to have green, yellow, red, black, grey stones and calcareous and mineral matter which are exposed to the sea water. While on a visit for seaweed collection, sulphur and acid fumes were noticed at certain locations.

The tidal amplitude varied from 1-1.5 m at most of the places. The wind velocity ranged from 0.10/m/s to 3.90 m/s at different times of observation. At most of the places the wind direction is in general from west to east.

The colour of the soil samples collected were pink, black, grey, whitish black, and so on ranging from blackish white to pink. A few of the soil samples contained shell bits or detritus. The samples of sand varied in graininess from medium coarse to medium fine.

Climatic conditions along the Kerala coast are characterised by pre-monsoon, monsoon and post-monsoon seasons from December to April, May/June to September and October to November respectively. The annual rainfall over the coast is high ranging from 1000 to 2000 mm.

The entire coastline of nearly 580 kms was covered during this survey and out of the 186 stations selected, seaweed growth was observed only in 53 stations. The coastline covered was divided into four ecological zones depending upon the dominance of rocks or sand in that region.

Zone I

In the southern part of the Kerala coast from Poovar to Thirumallavaram (a distance of 80 km) the coast is mostly sandy. However in this area rocks of different kinds and granite stones are found in patches in the inter-tidal and sub-tidal regions and

many species of green, brown and red algae were found to grow luxuriantly on them. In this zone rich growth of sea weeds occurs in the vicinity of Adimalathura, Chavara, Mullur, Vizhinjam, Varkala, Edava, Thangasseri, Tirumallavaram and Kovilthottam.

The seaweeds observed in this zone were.

1. *Ulva lactuca*
2. *U. fasciata*
3. *Enteromorpha intestinalis*
4. *E. compressa*
5. *Chaetomorpha antennina*
6. *C. linum*
7. *Bryopsis plumosa*
8. *Caulerpa peltata*
9. *Fadina gymnospora*
10. *Chnoospora minima*
11. *Sargassum wightii*
12. *S. berberifolium*
13. *Gelidium pusillum*
14. *Jania rubens*
15. *Grateloupia filicina*
16. *G. lithophila*
17. *Gelidiopsis variabilis*
18. *Gracilaria corticata*
19. *G. millardetii*
20. *Hypnea valentiae*
21. *Centroceras clavulatum*
22. *Ceramium rubrum*
23. *Spyridia filamentosa*
24. *Acanthophora spicifera*

The dominant species in this region were : *Ulva lactuca*, *Chaetomorpha antennina*, *Sargassum wightii*, *Gracilaria corticata* and *Hypnea valentiae*.

The total wet weight of the above 24 species was estimated at 84.471 t for an area of 75750 sq. m.

Zone II

North of Tirumallavaram the coast is sandy upto Paraparangadi (a distance of 270 km) but the sea wall laid with granite stones has helped the following vegetation to settle down on this substratum washed by the tides of the sea.

1. *Ulva lactuca*
2. *Enteromorpha intestinalis*
3. *E. compressa*
4. *Chaetomorpha antennina*
5. *Sargassum wightii*
6. *Gelidium pusillum*
7. *Grateloupia filicina*
8. *G. lithophila*

Of these 8 species, *Ulva lactuca*, *Enteromorpha compressa*, *Chaetomorpha antennina* and *Grateloupia filicina* dominate the vegetation.

The biomass of the seaweeds collected was estimated at 179.396 t for an area of 144000 square metres.

Zone III

North of Paraparangadi up to Cannanore (a distance of 84 kms) rocks and granite stones occur in the littoral and sub-littoral regions in some places where seaweeds were found to be growing abundantly. The important places where seaweeds grow abundantly in the region are Kadalundinagaram, Elathur, Kadalur (Nandi), Tikkodi, Sacrifice Rock (off Payyoli), Madapalli, Mahe, Tellicherry, Dharmadam Island and Cannanore.

The following species of seaweeds were found growing in the zone:

1. *Ulva lactuca*
2. *U. fasciata*
3. *Cladophora fascicularis*
4. *Chaetomorpha antennina*
5. *C. linum*
6. *Bryopsis corymbosa*
7. *Caulerpa sertularioides*

- | | |
|-------------------------------------|-----------------------------------|
| 8. <i>C. taxifolia</i> | 18. <i>G. lithophila</i> |
| 9. <i>Dictyota dichotoma</i> | 19. <i>Gelidiopsis variabilis</i> |
| 10. <i>D. barteyresiana</i> | 20. <i>Gracilaria corticata</i> |
| 11. <i>Padina gymnospora</i> | 21. <i>G. foliifera</i> |
| 12. <i>P. tetrastromatica</i> | 22. <i>G. millardetii</i> |
| 13. <i>Spathoglossum asperum</i> | 23. <i>Hypnea valentiae</i> |
| 14. <i>Sargassum wightii</i> | 24. <i>Centroceras clavulatum</i> |
| 15. <i>Gelidium pusillum</i> | 25. <i>Ceramium rubrum</i> |
| 16. <i>Pterocladia heteroplotos</i> | 26. <i>Acanthophora spicifera</i> |
| 17. <i>Grateloupia filicina</i> | 27. <i>Laurencia</i> sp. |

Out of the above species *Ulva lactuca*, *Ulva fasciata*, *Caulerpa sertularioides*, *Dictyota dichotoma*, *Spathoglossum asperum*, *Sargassum wightii*, *Gelidium pusillum*, *Gracilaria corticata*, *Gelidiopsis variabilis*, *Acanthophora spicifera* were dominant.

The total fresh weight of all the above species in the region was estimated to be 73.638 tonnes for a productive area of 78000 square metres.

Zone IV

Beyond Cannanore, the coast (a distance of 84 kms) is sandy upto Manjeswar (the northern border of Kerala) except for the occurrence of some rocks at Mt. Dilli, Bekal Fort and Manjeswar.

In this region, only *Ulva lactuca*, *Chaetomorpha antennina* and *Gracilaria corticata* occur dominantly and the total fresh weight of them was estimated to be 17.704 tonnes for an area of 18000 square metres.

The quantities of different groups of seaweeds comprising 35 species were: green algae 245.94 t, Red algae 91.63 t and brown algae 18.11 t in the order of their abundance.

Out of these, the economically important seaweeds contributed about 15.31% and the other seaweeds to 84.69%. The individual values for the commercially important seaweeds were : agarophytes 27t. followed by alginophytes of 18.12t and agaroidophytes of 9.28t as against the other seaweeds of 300.83t (including edible species) making a total of 355.23 tonnes for an area of 315750 sq.m.

From the above it can be deduced that the average seaweed density works out to 1.125 kg/m², the figure for the same for Goa coast is around 1.671 kg/m² (Untawale & Dhargelkar, 1975) The annual production of seaweeds for the entire coast is estimated around 1000 tonnes depending upon the number harvests the seaweeds usually sustain.

The above value for the seaweed resources of this coast appears to be low when compared to other seaweed growing areas in the country and hence it cannot sustain any seaweed based industry in the State at present. However attempts can be made by concerned agencies to manage and augment the resource by various methods of seaweed culture and by increasing the substratum for growth of seaweeds in some potential areas like Mullur, Vizhinjam, Varkala, Tirumullavaram, Thangasseri, Tikkodi, Sacrifice Rock, Cannanore, Mt. Dilli, Bekal Fort etc. Some of the economically important seaweeds like *Gracilaria edulis*, *Euचेuma* etc. can be introduced from other areas and grown along this coast to increase the resource.

ACKNOWLEDGEMENTS

Our sincere thanks are due to Dr. P.S.B.R. James, Director, CMFRI, Cochin and to Dr. K. Radhakrishna, Head, FEM Division for their encouragement in conducting these investigations and to Shri M. S. Rajagopalan, Scientist S-3 of this Institute for critically going through the manuscript.

REFERENCES

- Balakrishnan nair, N. V. Shobha Arunachalam M. 1982. Algae from southern Kerala coast. *Indian J. Mar. Sci.*, 11 (3) : 266-269.
- Bhanderi, P. P. & Trivedi Y.A. 1975. Seaweed Resources of Hanumandandi reef and Vumani reef near Okha Port. *Indian J. Mar. Sci.*, 4 (1): 97-99.
- Chauhan, V.D. & Krishnamurty V. 1967. Observations on the output of oospores, their liberation, viability and germination in *Sargassum swartzii* (Turn) C. Ag. *Proc. Semi. Sea Salt and Plants*, CSMCRI, Bhavanagar, pp. 197-201.
- Desai, B.N. 1967. Seaweed resources and extraction of alginate and agar. *Proc. Semi. Sea Salt and Plants*. CSMCRI, Bhavanagar, pp. 343-351.
- Dhargelkar, V.K., 1981. Studies on the marine algae of the Goa Coast, Ph.D. Thesis, Bombay University, Bombay, 186 pp.
- Subbaramaih, K., Rama Rao. K. Nair, M.R.P. Krishna Murty C.V.S. & Paramasivam M. 1979a, Marine algal resources of Tamil Nadu. *Proc. Int. Symp. Marine Algae of the Indian Ocean Region*, CSMCRI, Bhavanagar, India, P. 14 (Abstract).
- Subbaramaih, K., Rama Rao K. & Nair N.R.P. 1979b, Marine algal resources of Lakshadweep. *Ibid.*, pp. 6-7 (Abstract).
- Untawale. A.G., Dhargelkar, V.K. Agadi V. V. & Jagtap T.G. 1979, Marine algal resources of the Maharashtra Coast. *Tech. Report. Natl. Inst. of Oceanography*, Goa, 48 pp.
- Untawale, A.G. & Dhargeikar V.K. 1975. Report on the seaweed resources of the Goa Coast, NIO, Dona Paula, pp. 1-10.

