

Diversity of Marine Algae from Alibag Sea shore and Kulaba fort in Raigad District.

Dr. (Mrs.) Minal A. Patil

Assistant Professor, Department of Botany,

J. S. M. College, Alibag, Raigad, (University of Mumbai) Maharashtra, India

meenal1509@gmail.com

Abstract: India, the sub-continent is blessed with both east and west coasts having more than 7000 km. of coastal stretch and a number of islands located therein, which harbours a large number of marine macrophytic algal species. On the West Coast of India, in the Arabian Sea the Gulf of Kutch and Gulf of Cambay are the important Gulfs, while the Arabian Sea touch the land at the shores of Gujarat, Maharashtra, Goa, Karnataka and Kerala. Maharashtra has a sea coast of 720 Km. along the five districts including Mumbai. There are many islands along the coast. Raigad is one of the district of it extends from Shriwardhan taluka in south to Uran taluka in North. It has rocky shores at many of the places. Alibag is the district place of Raigad. There is a sea fort known as Kulaba which is an island at the distance of two kms from shore. The shore is abundant in marine algae.

The first record of any algae from the Indian Ocean is perhaps that of a specimen of *Amphiroa* collected by Hermann as early as 1672. Koing came to India in 1767 as a missionary and made extensive marine algal collections. An attempt was made to identify and study the marine algae from the shore of Alibag and the surroundings of Kulaba fort. There were many large and small marine ponds in the intertidal zone holding the benthic algae. The study was carried out throughout the year in 2022-23. Apart from sea weeds and grasses colourful fishes, various crabs, beautiful corals, marine mammals and various organisms were observed growing in the ponds. Total 30 species of the marine algae were reported in the study. It shows various types of marine algae like *Caulerpa*, *Ulva*, *Chaetomorpha*, *Sargassium*, *Gracilaria*, *Gelidiopsis*, *Codium*, *Padina*, *Cladophora*, *Enteromorpha*, *Porphyra*, etc. found in large quantity. Biodiversity of macro marine algae plays an important role in the marine ecosystem. Detail of the marine algae identified are described in the paper. Taxonomic distribution along the various classes as *Chlorophyta*, *Phaeophyta*, and *Rhodophyta* is also discussed.

Keywords: marine algae, shore, beach, kulaba, Alibag

I. INTRODUCTION

Algae are the most common marine vegetation commonly called "Seaweeds". They are classified into Blue-green (Cyanophyta), Green (Chlorophyta), Brown (Phaeophyta) and Red (Rhodophyta). Seaweeds play important role in marine food chains. It is assumed that seaweeds will play an important role as the food could become a major food in the 21st century. Biodiversity is the variety among living organisms occurred in a particular set of ecological conditions. In present study, the diversity and distribution of marine macro algae study was carried out at the rocky shore of Alibag and in surrounding of Kuala fort situated at 2 km inside the coast. Due to industrial growth and other human activities, the marine environment suffers from heavy pollution. It has a great impact on marine algal biodiversity. Marine flora from Bombay coast has been investigated by many workers. Even on Konkan coast Malvan and Ratnagiri localities were explored by some workers; but many of the localities from Raigad district are not explored yet. Therefore it was decided to fill up this gap and this was initiated with this site.

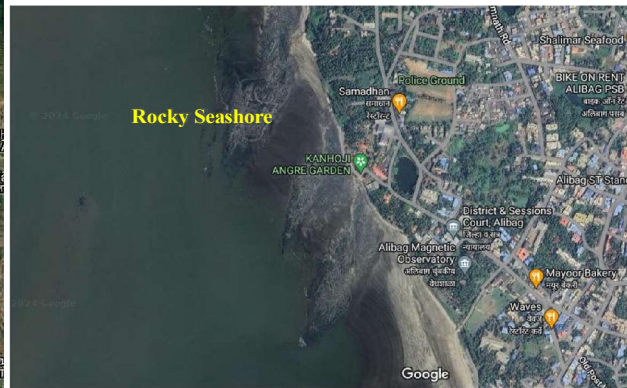
II. METHODOLOGY

Location of study:

India is having about 6160 km of sea coast of which Maharashtra alone contributes nearly 720 km of coastal region. Only five districts of Maharashtra cover this large coastal zone viz. Thane, Mumbai, Raigad, Ratnagiri and Sindhudurga. Raigad district occupies 122km of the coast. The major beaches along the Raigad coast are Shriwardhan, Murud, Kashid, Nandgaon, Revadanda, Nagaon, Alibag, Kihim, Saswane and Mandawa. There are many islands inside the sea along the coast. They are Janjira fort, Padmadurga fort, Korlai fort, and Kulaba fort, Khanderi, Underi and Gharapuri.



Rocky shore at Alibag beach



Location of Alibag and Kulaba fort (Source : Google maps)



Kulaba Fort with surrounding ponds in rocks

Study was carried out at the Alibag Sea shore and at the Kulaba Fort. Alibag is situated at 11 nautical miles from Mumbai lies at 18.6554° N, 72.8671° E.

Collection of Marine algae:

The collection was made for a year. The area was visited at least once in a month to observe the algal growth. The collection of seaweeds from the intertidal area is done during the low tide. Specimens were collected in polythene bags and then after washing transferred to specimen bottles containing 4% formalin for wet preservation while larger specimens has preserved as herbarium. The green algae were preserved in their natural colour by using a

formulation of cupric sulphate (0.5gm) + water (38ml) + Glacial acetic acid (4 ml) + 4% formalin (8ml) + 95% Ethyl alcohol (50ml).

Collected species were examined under dissecting, compound microscopes for taxonomic study (identification). The specimens were identified with the help monograph Phaeophyceae of India by Mishra (1966), green algae Krishnamurthy (1972).



Marine algae growing in the ponds at shore

Collection of Algae on Alibag seashore

Diverse habitat types at each collection site were surveyed in order to obtain a representative census of algal diversity. There are small and large ponds on the rocky beach and on the skirt of fort. They support the marine algae. Algal species vary according to depth of the pond. Some of the ponds are get submerged only at the high tide once in 15 days. Some algal species growing in deep water are found to be fragmented along the beach.

III. LITERATURE REVIEW

Marine algal studies from Konkan region of Maharashtra was initiated in the late 19th century. The credit for the first report of marine algae from Maharashtra goes to Shri Kirtikar (1886) who read out a paper on marine algae collected by Hon. Justice Birdwood, from Ratnagiri coast (Deodhar, 1987). Biodiversity of marine algae along the east and west coast regions of India was studied by several authors (Srinivasan, 1946; Gopalkrishnan, 1970; Kalimuthu, 1995; Sahoo et al. 2003; James, 2004; Venkataraman, 2005; Rath and Adikary 2006 and 2007. Near about 624 species of seaweeds have been recorded from the Indian sea coast. Untawale and Dhargalkar, (1975) and Agadi and Untawale, (1978) surveyed the seaweeds from the Goa coast. Untawale, et al. (1979) reported 94 species of seaweeds from the entire coast of Maharashtra.

IV. RESULT AND DISCUSSION

The different types of algal species recorded in the study are listed in the Table No.1

Table No. 1: List of Algal species recorded alone Alibag sea-shore and Kulaba fort

Sr. No.	Name of the Algal Species	Class	Order	Family
1.	<i>Agardhiella subulata</i> (C. Agardh) Kraft & M. J. Wynne	Rhodophyta	Gigartinales	Solieriaceae
2.	<i>Caulerpa racemosa</i> (Forsskal) J. Agardh	Chlorophyta	Bryopsidales	Caulerpacaeae
3.	<i>Caulerpa microphysa</i> (Weber Bosse) Feldmann	Chlorophyta	Bryopsidales	Caulerpacaeae
4.	<i>Ceramium diaphanum</i> (Lightfoot) Roth	Rhodophyta	Ceramiales	Ceramicacaeae
5.	<i>Chaetomorpha antennina</i> Bory de Saint-	Chlorophyta	Chladophorales	Chladophoraceae
6.	<i>Chaetomorpha crassa</i> (C. Agardh) Kützting	Chlorophyta	Chladophorales	Chladophoraceae

7.	<i>Chaetomorpha media</i> (C. Ag.) Kuetzing	Chlorophyta	Chladophorales	Chladophoraceae
8.	<i>Champia compressa</i> Harvey	Rhodophyta	Rhodimaniales	Champiaceae
9.	<i>Chondria armata</i> Kuetzing	Rhodophyta	Ceramiales	Rhodomelaceae
10.	<i>Cladophora fascicularis</i> (Mert.) Kuetzing	Chlorophyta	Cladophorales	Chladophoraceae
11.	<i>Cladophora gracilis</i> Grif (ex Harvey)	Chlorophyta	Cladophorales	Chladophoraceae
12.	<i>Cystoseira indica</i> (Thivy & Doshi) Mairh,	Phaeophyceae	Fucales	Sargassaceae
13.	<i>Dictyota dichotoma</i> (Hudson)Lamouroux	Phaeophyta	Dictyotales	Dictyotaceae
Sr. No.	<i>Name of the Algal Species</i>	Class	Order	Family
14.	<i>Dictyopteris woodwardia</i>	Phaeophyta	Dictyotales	Dictyotaceae
15.	<i>Ectocarpus simpliciusculus</i> C.Agardh	Phaeophyta	Ectocarpales	Ectocarpaceae
16.	<i>Enteromorpha intestinalis</i> (Linnaeus) Nees	Chlorophyta	Ulvaes	Ulveaceae
17.	<i>Gelidiella acerosa</i> (Forsskal)J.Feldmann & G.Hamel)	Rhodophyta	Gelidiales	Gelidiellaceae
18.	<i>Gelidium heteroplatos</i> Boerg	Rhodophyta	Gelidiales	Gelidiellaceae
19.	<i>Gelidium pusillum</i> (Stackhouse)Le Jolis	Rhodophyta	Gelidiales	Gelidiellaceae
20.	<i>Gracilaria corticata</i> (J.Agardh)J.Agardh	Rhodophyta	Gracilariales	Gracilariaceae
21.	<i>Gracilaria edulis</i> (S.Gmelin)P.Silva	Rhodophyta	Gracilariales	Gracilariaceae
22.	<i>Hypnea musciformis</i> (Wulfen) Lamouroux	Rhodophyta	Gigartinales	Cystocloniaceae
23.	<i>Hypnea valentiae</i> (Turner) Montagne	Rhodophyta	Gigartinales	Cystocloniaceae
24.	<i>Jania rubens</i> Lamour.	Rhodophyta	Corallinales	Corallinaceae
25.	<i>Padina tetrastromatica</i> Hauck	Phaeophyta	Dictyotales	Dictyotaceae
26.	<i>Polysiphonia platycarpa</i> Borgesen	Rhodophyta	Ceramiales	Rhodomelaceae
27.	<i>Porphyra vietnamensis</i> t.tanaka & Pham-Hoang Ho	Rhodophyta	Bangiiales	Bangiaceae
28.	<i>Sargassum filicifolium</i> (Turner) C. Agardh	Phaeophyta	Fucales	Sargassaceae
29.	<i>Ulva fasciata</i> Delile	Chlorophyta	Ulvaes	Ulveaceae
30.	<i>Ulva lactuca</i> Linnaeus	Chlorophyta	Ulvaes	Ulveaceae

Photographs of some of the Algal species collected in the study









Ulva



Enteromorpha

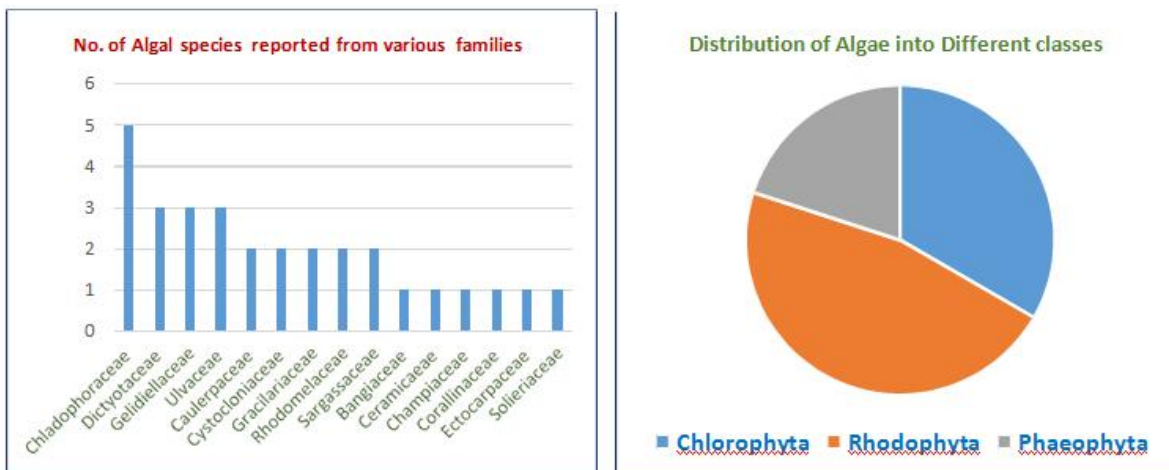


Padina

		
Caulerpa	Dictyota	Ceramium
		
Chondria	Sargassum	Gelidium

V. CONCLUSION

Totally 30 species of seaweeds were reported from the coastal region of Alibag and Kulaba fort of these 33.33% species belong to Chlorophyta, 46.66% to Rhodophyta, and 20.00 % to Phaeophyta. Species of *Ulva*, *Chaetomorpha*, *Enteromorpha*, *Sargassum*, *Padina*, and *Gracilaria* are common in this region. Total 74 seaweeds have been reported by Dhargalkar (1981) and Agadi (1986) from Goa coast. In the revised checklist of marine algae 844 species were reported from India, comprising 216 species of chlorophyta, 191 species of phaeophyta, 434 species of rhodophyta and 03 species of xanthophyta indicating a considerable increase in the species recorded from India (Oza and Zaidi, 2001). Intertidal regions support rich growth of algae belonging to the genera *Ulva*, *Enteromorpha*, *Chaetomorpha*, Ditches and Rocks are observed at Diversity of marine algae in the west coast showed that the members of Rhodophyta were dominant followed by Chlorophyta. Algae's were reported from 15 families. Maximum species were reported from the family Cladophoraceae (5) followed by Dictyotaceae (3), Gelidiellaceae (3) and Ulvaceae (3). Maximum species of the algae were reported from the genus *Chaetomorpha* (3).



Marine biodiversity needs systematic study. Thus adverse effect of pollution is observed more on the marine algal community of Bombay. Still the biodiversity of marine algae at the Alibag and Kulaba fort is reach. One species of *Caulerpa* is also reported in the study which indicates that the level of pollution is not severe. But it will be essential to maintain the existing habitats and niches to sustain this biodiversity of algal community.

ACKNOWLEDGMENTS

I would like to express my gratitude to Hon'ble, Adv. Gautam Patil, President, Janata Shikshan Mandal for permitting

REFERENCES

- [1]. Agadi, V.V. and A. G. Untawale 1978 Marine algal flora of the Goa coast. Seaweed Research and Utilization, 3(1&2), 56-70.
- [2]. Biswas, (1945) : A general review of marine algae of west coast of India., 45(5):515-630 |
- [3]. Boergesen, F. (1932a): Some Indian Rhododphyceae especially from the shores of Presidency of Bombay. Kew Bull 133-134.
- [4]. Kobenhavn. Chaugule B.B, (1989): Siphonaceous green alga at konkan coast, seaweed Res. Utiln. 11(2): 107-115. |
- [5]. Krishnamurthy V. et.al. (1972), The importance of shore types in intertidal ecology of Indian marine algae Proc. Indian natl. Sci. Acad., 38B: 259 - 266
- [6]. Deshmukh Sanjay,(2004) : Pollution in biodiversity rich coastal region of Maharashtra– Source and management Measures.(Environment of Maharashtra 2004)
- [7]. Dhargalkar, V. K. 1981 Studies on marine algae of the Goa coast, Ph.D thesis, Bombay University, India.
- [8]. Dixit, S. C,(1940) : Algae of Malvan harbour J. Univ. Bombay.,8(5): 1-19
- [9]. Kirtikar, (1886): A new species of algae Conserve Thermals Birdwood. J. Bomb.Nat.Hist Soc., 1:135-138.
- [10]. Masuma M. Hakim, Anita D. Solanki and Illa C. Patel (2022), Marine algae diversity at coastal area of Veraval, Gujarat, International Association of Biologicals and Computational Digest, Volume I Issue II, July-December 2022, pp: 22-30.
- [11]. Misra, J.N.1966 Phaeophyceae in India. ICAR, New Delhi,pp.1-97
- [12]. Redekar P. D, (2000): List of Marine Algae along Ratnagiri coast – Salt.Ros.Ind. 14(1) (1-10).
- [13]. Srinivasan, K. S. (1973): Phycologia Indica. Voi. II. Botanical Survey of India, Calcutta, p.1-52.
- [14]. Srinivasan, K. S. (1969): Phycologia Indica. Voi. I. Botanical Survey of India,Culcutta,p.1-60
- [15]. Untawale, A.G and V. K. Dhargalkar 1975 Seaweed resources of the Goa Coast. National Institute of Oceanography. Publication, Dona Paula. 1-10.

- [16]. Untawale, A.G., V. K. Dhargalkar, V.V Agadi, and Jagtap, T.G. 1979 Marine algal resources of the Maharashtra coast. Tech. Report. (National Inst. Oceanography, Goa. India), 48.
- [17]. Untawale, A.G, V.K. Dhargalkar and V. V. Agadi 1983 List of marine algae from India. National of Institute Oceanography. Goa. 1-42
- [18]. <https://in.pinterest.com/pin>

ABOUT AUTHOR

Dr. Minal A. Patil, M, Sc., Ph.D., B.Ed.



Dr. Minal A. Patil is working as Assistant Professor in Botany at J. S. M. College, Alibag. She has a teaching experience of 24 years. Her area of research is Mycology and Mycorrhiza. She has completed her research for M.Sc. on “Rhizosphere and non-rhizosphere flora of the Medicinal Plants”. She has completed her Doctoral research on the topic “Studies on Fungi associated with mangrove ecosystems of different habitats of Raigad District in Maharashtra.

She has completed One Minor research Project of UGC and one from University of Mumbai on the topic Mycorrhizal Associations