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Biodiversity of Marine Benthic Algae from Intertidal Zone of Konkan Coast. (Maharashtra)

KEYWORDS: Marine algae, Konkan coast, Chlorophyta

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ABSTRACT *The purpose of this paper is to introduce the phycologists towards diverse algal flora from the coast of Konkan zone. The present work is sequel of scientific studies on marine algal flora of Dapoli tahasil of Ratnagiri district in Maharashtra.*

During the algal biodiversity studies on coast of Dapoli tahasil, 46 species belonging to 34 genera were gathered. Benthic algae collected during the study belongs to Cyanophyta(02), Chlorophyta(13), Phaeophyta(09) and Rhodophyta(22).On the basis of number of taxa Rhodophyta was dominant on all the studied sites. The species-genera ratio for studied sites is 1.36 which indicates increase in pollution level of studied coast from 2000.

Introduction-
Due to industrial growth and other human activities, the marine environment suffers from heavy pollution. It has a great impact on marine algal biodiversity. Boergesen (1935) commented upon highly polluted marine environment of Bombay. Since then the human interference has increased tremendously due to modernization.(Deshmukh 2004)

Biodiversity is the variety variability among living organisms and the ecological complexes in which they occur. Credit of the first publication of work on Maharashtra coast goes to Kirtikar (1986), he published a paper on marine algae from Ratnagiri coast. Biodiversity of marine algae along the East and West coast regions of India was studied by several authors, Boergesen, 1932; Srinivasan, 1973; Balkrishan, 1981; Biswas, 1945; Chaugule B.B. 1989; and Krushnamurthy, 1972. Most of the research work in the field of marine phycology on the Konkan coast has been carried out along the coast of Mumbai (Deodhar 1987), Malvan (Dixit 1940), Konkan (Phanase 2000), and Ratnagiri (Redekar 2000). Though, many research workers have contributed phycological studies in India, author would particularly like to focus on the research work in Maharashtra.

The present quantitative study was undertaken by selecting the three study sites from the coastal region of Dapoli. 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 Ratnagiri district remained ignored still today. Considering the paucity of information on the biodiversity of marine algae on Konkan coast and to concentrate on smaller areas for detail floristic study of marine algae, the presented work was carried out.

Material and Methods-
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. Ratnagiri is one of the districts which occupies near about 140 km of the coast. Dapoli is situated at 700-800 ft above mean sea level and posed on $17^0$45'N and $73^0$10'E. It is situated 240 Km south to Mumbai

For present investigstion three sites from Dapoli tahasil viz. Harnai, Kolthare and Panchanadi were selected.

Harnai – This rocky location is situated 18km far from Dapoli. It shows abundant rock pools and tide pools. There is an island sea fort titled 'Kanakdurga'. Besides this, Goagad and Fattegad are the other forts along the coast.

Kolthare – Kolthare is 22km from Dapoli and 3km from Panchanadi by road. The rocky beach of this locality is extending about 1.5-2.5km. It harbours diverse algal flora.

Panchanadi – It is nearest to the Kolthare, about 03 km. It is also a nice site for algal collection, it habiting good number of species in rock pools and tide pools.

Harnai and Kolthare were visited in every month, whereas Panchanadi was visited three times throughout the period of survey. The collection was made for two consecutive years (22 months) i.e. from July 2006 to April 2008.

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) (Textbook of Algae- Sambamurthy)

Collected species were examined under dissecting, compound microscopes for taxonomic study (identification). Wherever necessary, T.S. of thallus or sex organs were examined by preparing slides. Aniline blue in lacto-phenol was used as stain.

The dimensions of cells and reproductive bodies were measured by using ocular and stage micrometer. Internal and external characters were marked by sketches made using prism type Camera Lucida.

Specimens were collected in polyethylene bags and then after washing transferred to specimen bottles containing 4% formalin solution for wet preservation while larger specimens has preserved as herbarium.

The specimens were identified with the help monograph Phaeophyceae of India by Mishra (1966) green algae Krishnamuthy (1972), Phycologia Indica. Voi. II by Srinivasan, (1973)

Result and Discussion-
The 46 specimens of benthic algae under 34 genra from four

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major algal divisions were recorded through the period of investigation. Table no. 01 gives a list of all the 46 species from 34 genera belonging to Cyanochloronta, Chlorophycophyta, and Pheophycophyta and Rhodophycophyta. Here occurrence of particular alga studied at three different localities from Dapoli tahasil is indicated. Accordingly, the station wise distribution is given below.

At Harnai, 33 genera were collected which includes 43 species. This site harbours maximum number of species of all localities. Cyanochloronta represents 2 genera of 25 species; Chlorophycophyta represent 13 species belonging to 08 genera; Pheophycophyta includes 9 species from 07 genera & Rhodophycophyta includes 23 species belonging to 16 genera.

This locality shows rich growth of algal flora. However, this site remained unexplored by earlier workers. 40 species belonging to 31 genera were encountered from kolthare. The division wise distribution of collected genera & species are as follows. Chlorophyta 09 genera of 12 species; Pheophyta comprise of 08 species from 06 genera & Rhodophycophyta includes 25 species belonging to 17 genera.

At Panchanadi 34 species were collected. These forms belonging to 27 genera of which 01 genera of 01 species of Cyanochloronta, 06 genera of 09 species of Chlorophycophyta; 08 species belonging to 07 genera of Pheophycophyta and 17 species belonging to 12 genera of Rhodophycophyta were gathered.

CSMCRI, Bhavnagar published a revised checklist of Indian marine algae, compiled by Krishnamurthy and Joshi in 1970. For entire coast of India they were collected 122 species belongs to 36 genera of Chlorophyta, 117 species belongs to 33 genera of Pheophyta and 252species belongs to 95 genera Rhodophyta. Chaugule and Gunale in 1981 reported 169 species belongs to 85 genus from Konkan coast. Phanase (2000) mention 56 species from 37 genus. In present work 33 genus includes 46 species were collected from coast of Dapoli tahasil.

One of the indicators of biodiversity is species-genera ratio; higher the value of species-genera ratio indicates the clear environment and lesser pollution, whereas lower ratio value indicates decrease in biodiversity. The species-genera ratio of present work is 1.36. This value is less than value calculated by Phanse (2000). Naturally if the comparison is made, over the period of 07 year the pollution level of Harnai has increased. Apart from the comparison author could collect *Pseudobryopsis mucronata,* and *Dictyota ciliate* for the first time from Dapoli tahasil.

For the comparison of seaweed flora of different geographical region like tropical and temperate, Cheney (1977) suggested R+C/P ratio. According to him the value of ratio above 06 indicates tropical flora while value less than 3 indicates temperate flora, the values between 3-6 are indicative of mixed flora as per Cheney. The Cheney ratio for present collection is 4.6. reveals mixed type of flora for present area under consideration.

It is important to note that even a single species of genus *Caulerpa* on the coast of Dapoli was not found during study which was very common on coast of Maharashtra (Deodhar, 1987 Bombay; Dixit, 1940 Malvan; Redekar, 2000). *Pseudobryopsis mucronata and Dictyota ciliate* were reported first time from Harnai. Therefore it will be interesting to evaluate the factors which cause complete absence of this genus from this region.

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Table- 01 List of marine algae recorded from Dapoli coast

Sr. No.	Name of alga	Name of the locality			
		Harnai	Kolthare	Panchanadi	
I	CYANOPHYTA				
01	*Lyngbya majuscula* Harvey ex Gomont	√	x	X	
02	*Microcoleus chthonoplastes* Thuret ex Gomont	√	x	√	
II	CHLOROPHYTA				
03	*Enteromorpha flexuosa* (Wulf) J. Ag.	X	√	x	
04	*Enteromorpha lingulata* J. Ag.	√	x	√	
05	*Enteromorpha linza* (L.) J. Ag.	√	x	√	
06	*Ulva lactuca* (Ag.) Lejolis	√	√	√	
07	*Chaetomorpha linum* (Muell.) Kuetzing	√	√	√	
08	*Chaetomorpha media* (C. Ag.) Kuetzing	√	√	√	
09	*Cladophora fascicularis* (Mert.) Kuetzing	√	x	√	
10	*C. gracilis* (Griffiths ex Harvey) Kuetzing	√	√	x	
11	*C. utriculosa* Kuetzing	√	√	√	
12	*Bryopsis pennata* Lamouroux	√	√	x	
13	Pseudobryopsis mucronata	√	√	x	
14	*Cladophoropsis zollingerii* (Kuetzing.) Boerg.	√	√	√	
15	*Spongomorpha indica* Thi. et.	√	√	√	
III	PHAEOPHYTA				
16	*Giffordia mitchellae* (Harvey) Hamel.	√	√	√	
17	*Sphacelaria furcigera* Kuetzing	√	√	√	
18	*Dictyota divaricata* (Hudson) Lamouroux	√	√	√	
19	*Dictyota dichotoma* (Hudson) Lamouroux	√	√	√	
20	*Dictyota ciliata* Jg. Agardh.	√	√	x	
21	*Padina tetrastromatica* Haudc	√	√	√	
22	*Stoechospermum marginatum* (C. Ag.) Kuetzing	√	√	√	
23	*Rosenvingea intricata* (J. Ag.) Boerg	√	x	√	
24	*Sargassum cinereum* J. Ag.	√	√	√	
IV	RHODOPHYTA				
25	*Porphyra vietnamensis* Tauaka et. Ho.	√	√	√	
26	*Gelidium corneum* (Huods) Lamouroux	√	√	x	
27	*Gelidium heteroplatos* Boerg.	√	√	√	
28	*Gelidium pusillum* (Stackhouse) Lejolis	√	√	√	
29	*Jania rubens* Lamouroux	√	√	√	
30	*Grateloupia filicina* (Wulf) C. A. Ag.	√	√	√	
31	*Gracilaria corticata* J. Ag.	√	√	√	

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32	*Gracilaria textori* (Suring) J. Ag.	√	√	√	
33	*Sarconema filiforme* (Sond.) Kylin	X	√	√	
34	*Hypnea valentiae* (Wulf) Lomouroux	√	√	√	
35	*Champia compressa* Harvey	√	√	x	
36	*Callithamnion byssoides* Ach. Port.	√	√	x	
37	*Ceramium byssoideum* Harvey	√	√	√	
38	*Centroceras clavulatum* (C. Ag.) Montagne	√	√	√	
39	*Crouania attenuata* (Bonnemaison) J. Ag.	√	√	x	
40	*Acanthophora delilei* Lamouroux	√	√	√	
41	*Acanthophora muscoides (L.)* Boergs.	√	√	x	
42	*Chondria armata* Kuetzing	√	√	√	
43	*Chondria cornuta* Boergs.	X	√	√	
44	*Laurencia obtusa (Hudson)* Lamouroux	√	√	x	
45	*Polysiphonia platycarpa* Boergesen	√	√	√	
46	*Dasya iyengarii* Boergesen	√	√		x

√ = Present **x = Absent**

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